

The Mining Journal

LONDON, NOVEMBER 16, 1956

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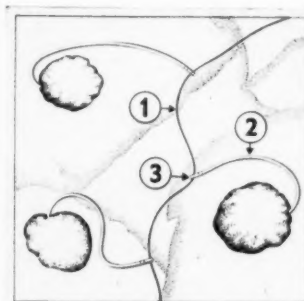
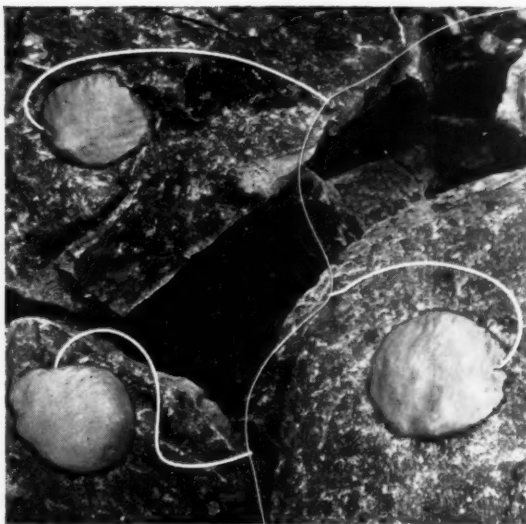
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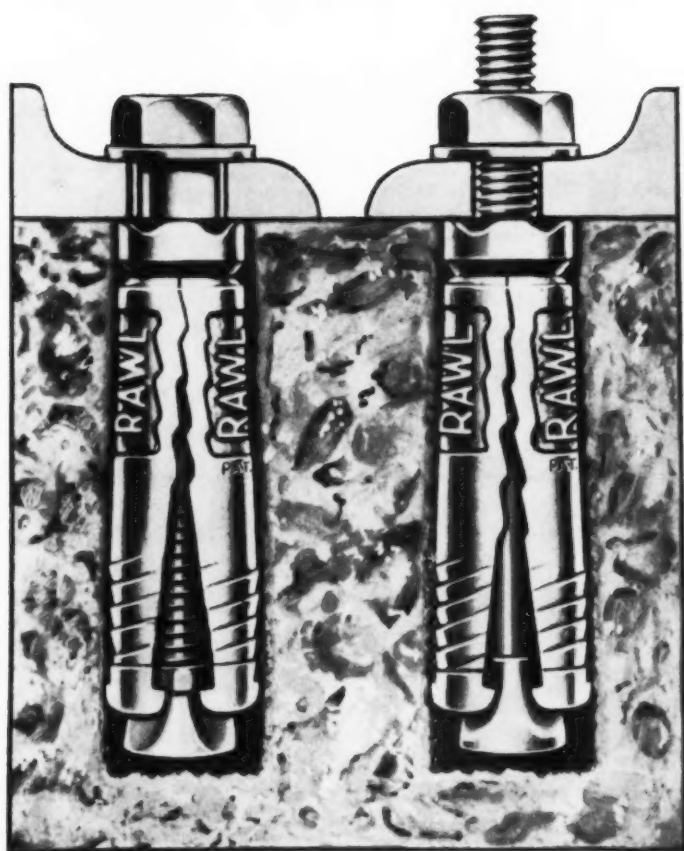
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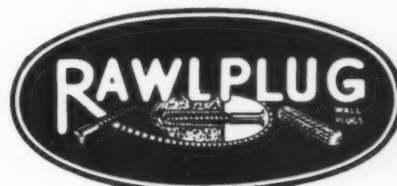
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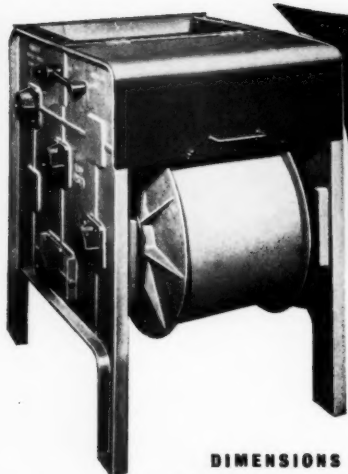
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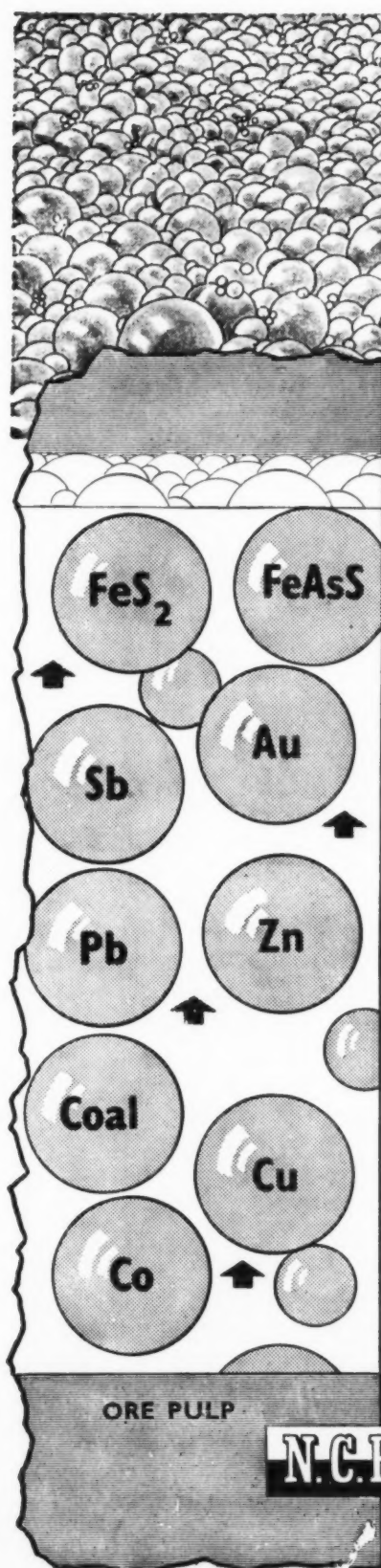
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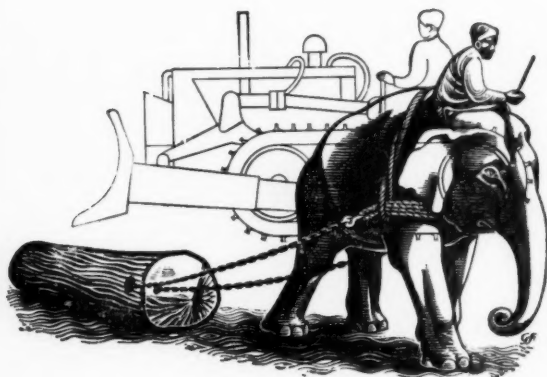
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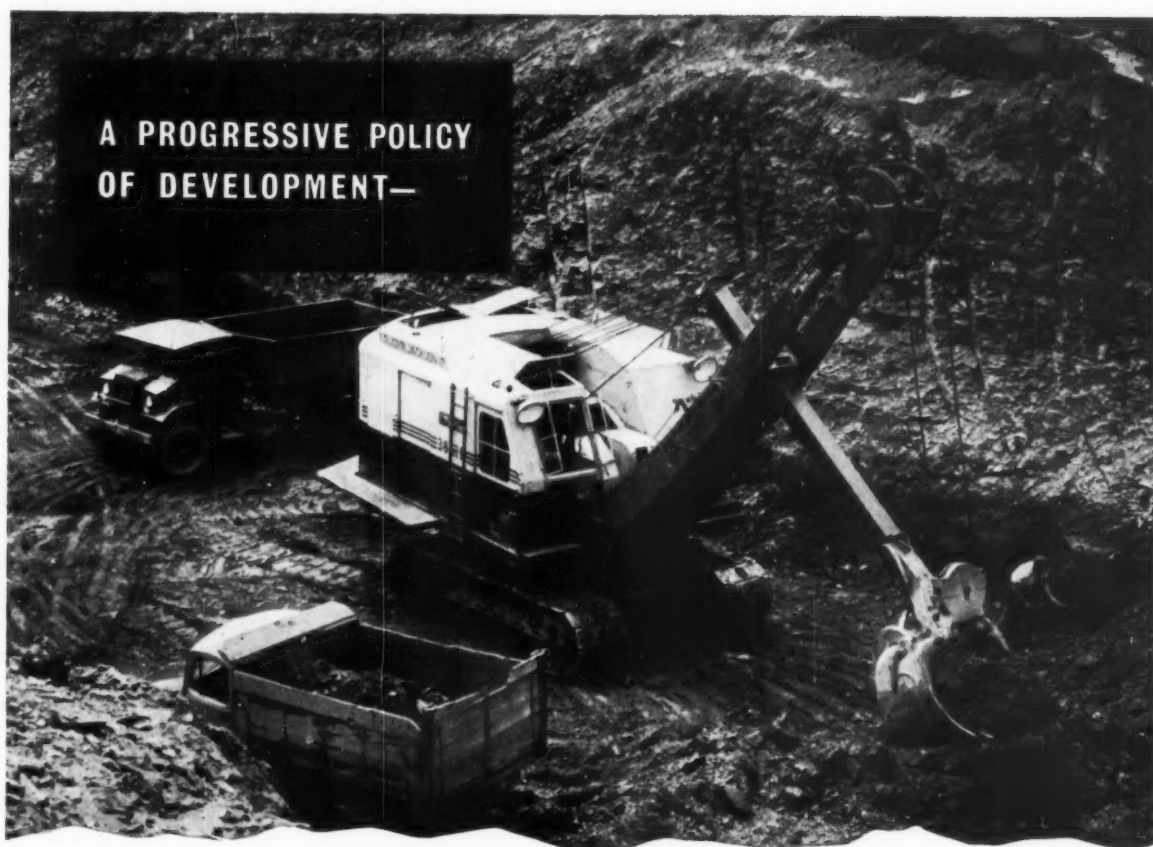
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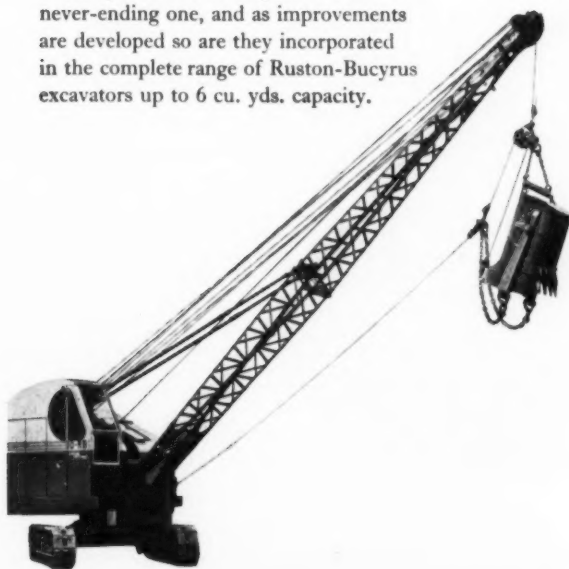
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The Mining Journal

London, November 16, 1956

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Joint Editors

U. Baliol Scott R. Bruce Dunfield

News Editor

A. G. Thomson

Financial Editor

I. M. Moseley

Assistant Editor

R. Bowran

Display Advertisement Manager

E. S. HOOPER

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Ships for the Ore Trades

SPECULATION as to the economic consequences of the Middle East crisis has so far been centred mainly on the problem of oil supplies. The blockage of the Suez Canal is leading to a rapid and progressive deterioration in the outlook for Western Europe, chiefly because there are not nearly enough reserve tankers available to make good losses caused by the longer hauls.

It is less generally realized that if the Canal remains closed for more than a very limited period, the effects will by no means be confined to goods which are normally shipped via Suez, for there are not enough carriers to meet additional demands on available world tonnage imposed by the long voyage round the Cape—indeed, the difficulties of British exporters are already being aggravated by the increasing competition for cargo space.

The mining industry is collectively by far the largest charterers of carrier ships. Vast quantities of ores and minerals are being shipped from all parts of the world to supply the insatiable and ever-expanding requirements of the more highly industrial countries. In fact, even before Suez, shipping resources were severely strained. The chairman of an Australian mining company in a report published a few weeks ago expressed great concern about the future shipping position from Australia. He pointed out that with the substantial increase in the demand for both rutile and zircon, present shipping facilities had become incapable of handling all tonnages offered for shipment from Brisbane to the east coast of America.

In order to ensure continuity of transportation—and also to minimize freightage costs—mining companies or associations are finding it expedient to become shipowners and are placing orders for ore carriers built to their own specifications. For instance, the British steel industry, has its own fleet of vessels specially designed for the iron ore trade, which will be increased next year to 15 ships having a total annual capacity of 2,225,000 tons. Reynolds now operates two bauxite ships between Jamaica and Gulf ports. Its subsidiary, the Caribbean Steamship Company, has under construction several self-unloading ore carriers for the bauxite trade. The largest is of 32,250 deadweight tons and will be built in Japan.

These examples are sufficient indication of the growing extent to which the mining industry is being compelled to enter the shipping field. This trend is almost certainly bound to become more and more pronounced as time goes on, if only because industrial expansion is leading to a corresponding increase in the consumption of raw materials and manufacturers are being compelled to draw supplies from further and further afield.

Indeed, it must be apparent that shipbuilding capacity cannot be expanded rapidly enough to keep pace with the increasing requirements for tankers, ore carriers, and freighters of every type. This situation is reflected in the order books of shipbuilding firms throughout the world, most of whom are heavily committed for years ahead. Failing a world-wide recession, delivery times may well continue to lengthen and costs of construction are likely to go

on rising, particularly as further increases in wages are to be expected.

Faced with the prospect of a world shortage of shipping which, whatever the outcome of the Suez crisis, may become increasingly acute as time goes on, many mining companies must be giving very serious consideration to the desirability of joining the queues at the shipping yards.

A FAILURE OF PUBLIC RELATIONS

Satisfaction at the inclusion of an article on "The Mining Engineer" in the comprehensive and instructive supplement on Careers published recently by *The Financial Times*, must be tempered by the reflection that, despite Britain's close links with metal mining throughout the Dominions and Colonies, mining continues to be regarded in these islands as virtually synonymous with coal.

Though the author, Prof. I. C. F. Statham, is a leading authority whose knowledge of mining is most assuredly not confined to coal, the article is written almost entirely from the standpoint of the British coal mining industry, its requirements, the prospects it offers, and the N.C.B. training schemes. Metalliferous mining and oil mining each rate only a single paragraph. As regards metalliferous mining, it is merely stated that prospects and opportunities exist, especially abroad, that the training qualifications and prospects are in general similar to those in coal mining, and that most of the universities previously mentioned in the article offer courses in metalliferous mining.

Up to a point these observations are, of course, quite correct, though they would appear to call for considerable amplification. Our criticism of the article is essentially that it gives a misleading impression to young men interested in mining as a career, who cannot be expected to realize from one short paragraph that metalliferous mining is, in fact, an entirely separate field from coal mining, calling for qualifications and standards which are obviously different, and offering opportunities of advancement which are at least as great. Yet it might even be said that young men who enter the service of metal mining companies overseas are of a different stamp to the general run of N.C.B. trainees. Not only are they more adventurous but they actually tend to be drawn from different strata of society.

Without in any way deprecating the importance of coal mining which is, of course, Britain's basic industry, we find it difficult to understand why so much emphasis has been placed on recruitment for domestic mining, when the supply of engineers for overseas appears to be even more critical. The U.K. is traditionally an exporter of mining graduates, and technologists trained in our universities have long played a key part in the development of metalliferous mining throughout the world. It may well be that in the long-term future our ability to balance our overseas payments may depend on the extent to which we can retain and strengthen our associations with metal mines overseas and so prevent them from falling into American hands.

Metal mining interests in the United Kingdom, as represented by such organizations as the British Overseas Mining Association and the Institution of Mining and Metallurgy, are fully conscious of the urgent need to accelerate the flow of graduates and trainees to companies and have devoted much time and effort to problems of recruitment and training. The fact remains that, despite the good progress which has been made on tax matters, the industry has not fully succeeded in persuading the government that more positive steps should be taken to further the interests of overseas mining, nor—apparently—have they succeeded in

making the general public metal-mining conscious. The assumption is still far too prevalent, even among those who ought to know better, that coal is the only mineral extracted from the ground.

The blame for this astonishing indifference to metal mining, which is essentially a failure of public relations, must be shared between the industry itself and a government which is apparently still unwilling to accept the necessity for the formulation of a coherent Commonwealth minerals policy.

So acute is the shortage of trained manpower in Southern Africa that the recruiting activities of the mining industry were extended to Europe with headquarters in London. This venture has recently been suspended and we have heard it suggested in some quarters that one of the reasons for discontinuing the organization was the high operating cost. This strengthens our opinion that, over a period, closer attention to public relations, by promoting a better understanding of the importance of metal mining and the opportunities it offers to young men of the right type, could do much to alleviate the existing shortage of skilled manpower, thus yielding very handsome dividends on the doubtless considerable expenditure involved.

It is only fair to add that B.O.M.A. is shortly to publish a brochure for schools discussing this whole question of careers in overseas mining. This is just the sort of initiative which is required, but we would stress that any public relations programme must be sustained over a considerable period to get results.

SELF-HELP FOR UNCLE SAM

Speaking at a convention of the American Coke and Chemicals Institute, Mr. Spencer S. Shannon, director of the Office of Minerals Mobilisation, stressed the marked improvement in national preparedness in minerals since the Cabinet Committee on Minerals Policy reported to the President and the Office of Minerals Mobilisation was established. This he ascribed to the inauguration of new programmes (such as the long-term stockpile), new emphasis on existing powers which had been little used (such as barter of agricultural surpluses for strategic materials), a new insistence on sound planning, and an improved organisation structure for handling minerals and solid fuel mobilisation problems.

The U.S. Government has by no means succeeded in solving all the problems of minerals mobilisation, but, in the words of Mr. Shannon, plans have been made so that the nation "may live within the shortages if war should come in the near future." Much has, in fact, been accomplished to reduce dependence on overseas sources for supplies of certain strategic minerals.

As a notable example of the benefits resulting from a planned minerals policy O.M.M.'s director referred to the nation's dwindling supply of iron ore. He told the convention that the recovery of iron ore from low-grade taconite deposits was coming into its own. Last year the taconite programme produced more than 1,000,000 tons of iron ore concentrates and will soon be producing about 20,000,000 tons annually. By 1960, about one-fifth of the U.S. iron ore supply may be imported from fields being developed in Canada, Venezuela and Africa. There are indications, however, that the taconite recovery programme may develop sufficient savings to make these domestic low-grade deposits competitive with foreign ores.

Among the far-reaching changes effected through use of high grade (60 per cent and over) iron ores from Venezuela has been a reduction of the coke-to-ore ratio in some areas, particularly in Alabama. By using these high-grade foreign ores the steel industry has been able to avoid coke shortages.

Mr. Shannon also said that the U.S. export of more than 40,000,000 tons of coal annually to Europe might continue "indefinitely," so that it was desirable to consider the extent to which the domestic reserves of high-grade coal were being depleted. He outlined some of the incentives made through OMM for encouraging the solid fuels industry. Under this programme necessity certificates have been issued covering coke-making facilities, both new and rebuilt, with an annual capacity of 14,000,000 tons and a capital cost of \$600,000,000 and metallurgical coal capacity of 13,500,000 tons costing \$86,000,000. The goal for the expansion of capacity for the production of coke and metallurgical coal has now been closed.

When the tax amortization programme was initiated in 1950 one-half of the coke production was supplied by ovens over 30 years old and a third from ovens which had been in existence less than 10 years. By the end of 1955, only a fifth of the coke-making capacity was from ovens over 30 years old and 42 per cent is now being produced in ovens built within the last ten years.

It is evident that Uncle Sam's tonics for boosting the exploitation of domestic mineral resources are good and powerful medicines, which could with advantage be prescribed by the governments of other free-world countries.

THE USES OF METALS IN ATOMIC REACTORS

Nuclear power generation has necessitated the development of constructional materials with novel properties and is also resulting in new fields of application for established metals. The internal structures of nuclear reactors are quite complicated and the choice of materials is governed by the functions to be performed. The requirements of various reactor components, together with the advantages and limitations of available materials, were surveyed by Mr. Alfred A. Strasser, of the Nuclear Development Corporation, at an Atomic Industrial Forum held recently in Chicago.

When a reactor is built the boxes have to be bolted and welded together. The fuel elements have to be supported, as does the moderator. Control materials have to be protected and actuated. The heat transfer medium has to be pumped through pipes, valves and headers; headers in turn have to be attached to the reactor core. The whole reactor has to be put in a shell, which sometimes has to withstand considerable stresses arising from coolant pressure and temperature differences.

The materials of which these components are made have to satisfy the normal engineering requirements of each application. In addition, they must satisfy some of the peculiar requirements of a nuclear reactor. If the materials are in the core, they must have low absorption cross sections. In addition, they have to withstand the bombardment from fission fragments, neutrons, electrons and gamma radiation, which can cause considerable damage. The energy given up by various articles as they are slowed down and stopped by the structural materials eventually shows up in the form of heat. The effect of this heat on the properties must also be considered.

Aluminium, magnesium, beryllium and zirconium are desirable materials because of their low cross sections, but costs and other considerations may have to be taken into account. If reactor temperatures are to be increased beyond 700-800 deg. F., it becomes necessary to compromise on cross section and use such materials as iron, chromium, molybdenum, niobium, nickel, silicon and their alloys. Low alloy and stainless steels find many applications in

structural materials as do nickel base alloys such as Monel, Inconel and Nichrome. Molybdenum and niobium have good mechanical properties, but molybdenum has very poor oxidation resistance and is difficult to fabricate and weld. Some irradiation tests show that molybdenum is embrittled by radiation. Niobium also has poor oxidation resistance; it is easier to fabricate, but is scarce and hence expensive. Chromium base alloys have good high temperature properties, but their brittleness has kept them out of use.

There are various metals and materials which are suitable for use as moderators, absorber controls and shielding materials. Beryllium is an excellent moderator and also offers many engineering advantages. It has adequate tensile strength up to very high temperatures. Unfortunately, wrought beryllium is a brittle material. Beryllium with better ductility may be produced by powder metallurgy techniques. Beryllium oxide and beryllium carbide might both be considered as potential moderators for very high temperature reactors. Being ceramics, however, they are brittle and they do not have high thermal conductivities. The carbide is quite hygroscopic at room temperature. Beryllium oxide reacts with water vapour at temperatures greater than 2,000 deg. F.

Control devices should be able to effect large reactivity changes in small volumes. Hence materials of high neutron cross section are desirable. The most common control material is boron. A very practical way to save space in small reactors is to separate out and use the higher cross section of boron's isotopes, boron-10. Another control material is cadmium, which has the disadvantage of a low melting point (610 deg. F.) and, due to its peculiar variation of cross section with energy, has the further limitation of being ineffective for neutrons in certain energy ranges.

There are other less familiar high cross section materials such as the rare earths, samarium and gadolinium, which have cross sections of 65,000 and 44,000 barns/atom respectively, but so far none have proved as practical as boron or perhaps cadmium. Increasing quantities of hafnium are becoming available as a by-product of the zirconium process and this metal will find a growing application as a control material.

When neutrons are captured after slowing down, gamma rays are generally emitted. If these gamma rays become too troublesome, boron can be added to the shield. Neutron capture in boron results in the emission of non-penetrating alpha rays and weak gamma rays. Boron and lithium exhibit this property at low temperatures. There are several ways in which boron can be added. It can be added to concrete. It can also be added to steel in small amounts, but if the boron content exceeds about 1 per cent, steel becomes brittle and unmachinable. Ferroboration, which contains up to about 20 per cent boron, has also been suggested as a shielding material. A relatively familiar boron-containing material is boral, which consists of an aluminium plus boron carbide compact sandwiched between and bonded metallurgically to two aluminium sheets.

While for the most part light materials make the most desirable neutron shields, heavy materials make the best gamma shields. Lead is the most common of the very heavy materials and is a very good gamma shield, but because of its high cost, low strength and low melting point, its use is curtailed. Iron is frequently used as a gamma shield. Concrete is a mediocre gamma shield, but is so cheap that what it lacks in quality can be made up in quantity. There is a wide variety of special shielding concretes. Most of these have some heavy filler such as barytes rock or iron to increase the gamma shielding effectiveness. Some have boron-containing materials in them.

New Uses for Diamonds

LITTLE has been said about the contribution which the diamond industry is making to progress in atomic energy, electronics, gas turbines, and supersonic flight. Yet it is obvious that the diamond with its extreme hardness and outstanding resistance to temperature must be the most suitable material for many requirements arising from advances in these exacting fields.

The veil has to some extent been lifted by an article in *The Wall Street Journal*, whose staff reporter, Ray Vicker, recently had an opportunity of visiting the Diamond Research Laboratory in Johannesburg.

Industrial diamond consumption is currently bolstered by heavy U.S. government purchases for the defence stockpile. When stockpiling purchases cease, the industry will be faced with over-production and additional outlets must be found. De Beers Consolidated is therefore carrying out intensive research in order to find additional outlets for industrial diamonds.

Diamond Transistors

Among the most dramatic of the new developments originating from the Diamond Research Laboratory is the use of diamonds as replacements for germanium and silicon crystals in transistors for industrial and defence applications. Though most diamonds are non-conductors, research workers have discovered that certain blue diamonds are good semi-conductors and work well in transistors. Whereas a germanium crystal transistor can be used at temperatures up to 75 deg. C. and a silicon crystal transistor at up to 125 deg. C., diamond transistors may be used at temperatures of up to 500 deg. C.

Blue diamonds are extremely rare. However, attempts are now being made to introduce minute aluminium particles into more common diamonds by diffusion at high temperatures. Experiments indicate that introduction of such impurities may be one method of changing more plentiful diamonds into semi-conductors without detracting from their efficiency. Since only minute diamonds are needed in transistor applications, it is contended that they should not be unduly costly for this requirement.

Radiation Counters

Dr. J. F. H. Custers, a joint director of the Diamond Research Laboratory, stated that some diamonds might also be used as radiation counters. When an electron passes through a diamond of a certain type, electrons in the diamond are released, producing a small electrical current. This current may be amplified. In a delicate instrument that amplification may be coupled to a gauge to measure the radioactivity of the material which is producing the stream of electrons. The advantage of diamonds over conventional counters is that minute counters may be built with them.

Counter diamonds are even rarer than those with semi-conductor properties. Sometimes only one in a batch of a thousand proves suitable for counting.

Here again, investigators at the Laboratory are working intensively to isolate those factors which are responsible for a diamond's radiation counting properties. Once isolated, these factors may be injected into ordinary diamonds by artificial means.

Already it has been found that diamonds irradiated with neutrons turn bottle green in colour; those bombarded with beta rays turn blue, while those subjected to gamma rays become blue green. By heating irradiated diamonds to high temperatures colours may be changed again to amber or golden yellow. All the new colours are permanent at room temperature.

Such techniques for artificially changing diamond colours might conceivably play a part in future diamond fashion trends. To help diamond merchants to determine the difference between natural and artificially coloured diamonds, the laboratory has developed a discriminator instrument.

Mounting Diamonds on Tools

One of the most important of the research projects involves a new method of mounting diamonds as the cutting edges on tools. An important reason for the growing popularity of diamonds among industrialists is the trend towards closer tolerances in products. Where tolerances of 10,000ths of an inch and smaller are required, it is found that diamonds, because of their extreme hardness, will cut to precision dimensions better than any other material.

In industrial applications, however, a problem has always been presented by the mounting of diamonds on tools to form the cutting edges. In the conventional method a diamond is cemented in the tool socket, about three-quarters of the stone being buried in the socket and one-quarter left exposed to do the cutting. It follows that, in effect, three-quarters of the diamond is lost.

Massachusetts Institute of Technology first developed a method of binding diamonds on to flat metal through use of a super glue or solder. The Diamond Research Laboratory has carried this a step further and now has developed a method whereby a diamond may be cemented on to the flat end of a tool. Yet the stone, clings as tightly as if it were in a socket of the tool.

In one experiment, a worker drops some solder-like material (titanium hydride and silver solder) on to the flat head of a tool about the size of a small chisel. A diamond is set into the binder. The tool is then subjected to heat in an induction furnace. A nearby cylinder of hydrogen provides a layer of inert gas, which is laid over the stone during the heating process. In eight minutes the tool is removed, ready to be used on a cutting job.

The Diamond Research Laboratory is gratuitously passing on to industry various other ideas for using diamonds more economically, or in new applications. To help disseminate data in the U.S., the laboratory is working closely with the Armour Research Foundation and the Illinois Institute of Technology in Chicago, where diamond technology courses began in September, using teachers trained in Johannesburg.

According to *The Wall Street Journal*, the diamond industry in South Africa shows little anxiety about the development of artificial diamonds which are being produced artificially by the General Electric Co. "There are not enough diamonds in the world to-day to go round," said Dr. R. G. Weavind, Joint Director with Dr. Custers of the Diamond Research Laboratory. "The artificial diamond, if it is produced commercially, will help to broaden the market."

RANKING amongst the major causes of the disequilibrium in the national balance of payments, which has compelled the British government to impose successive measures of credit restraint, has been swollen pressure for steel for capital investment works and the exceptionally large imports of coal and steel required to make good the deficiencies in home production. Activity in the steel-using industries in recent years has increased at a rate which the British steel industry has failed to match, and as similar conditions have developed abroad, preparations are in hand for the expansion of capacity in both hemispheres on a hitherto unprecedented scale.

The resilience of American steel is profoundly impressive. The July strike involved a loss of crude steel production amounting to about 10,000,000 tons, but the subsequent recovery was so swift that in September U.S. steel furnaces turned out 10,445,000 tons of ingots and castings, a record for that month. Operations at the steel mills are now scheduled at over 100 per cent of rated capacity, and it is now estimated that the total output for the current year may only fall about 4,000,000 tons of the all-time record of 117,000,000 tons achieved last year.

All The World

Confidence that steel demand is on a permanently higher plane is expressed by the fact that in the past two months steel companies in the U.S. have filed plans for expansion projects costing \$1,300,000,000. According to an authoritative trade quarter, these projects are only the first instalment of long-term expansion plans which are expected to involve a total capital expenditure of \$6,300,000,000 in the next five years and add 23,600,000 tons to the industry's total capacity of 128,400,000 tons at the beginning of the current year.

The mobilization of financial resources on a colossal scale to stimulate the production of steel is not confined to the Federal Republic. A Washington statement affirms that since 1940 assistance amounting to over \$866,000,000 has been provided by the United States government and the World Bank to 24 foreign countries for the expansion of their respective steel industries.

It is emphasized that although the American steel industry has not directly invested in iron and steel-making plants abroad, it has contributed substantial benefits at local level through the development of iron ore mining and other facilities. In these developments, heavy investments have been made by American iron and steel companies in Venezuela, Chile, Brazil, Canada, Liberia and other countries with the result that U.S. ore imports have increased from 2,700,000 tons in 1940 to 26,300,000 tons in 1955. In approximately the same period world ingot production has increased 87.1 per cent and a further increase of 50,000,000 tons by 1960 is also projected.

Amongst the smaller States whose steel development plans have only recently been outlined are Portugal, Denmark and Pakistan. Our oldest ally proposes to proceed by three stages. First, the immediate construction of an iron smelting plant at Leixoes, near Oporto, with a capacity of 30,000 tons per annum, and a steel works and rolling mill at Alcochete, south of the Tagus. The second stage envisages the extension of the Alcochete enterprise by the erection of an additional blast furnace and the final target to be reached in 1964 with the establishment of two Krupp-Renn furnaces at Leixoes with a combined capacity of 120,000 tons and the extension of the steel works and rolling mill either at Alcochete or by the estab-

lishment of another plant in Northern Portugal.

The Danish programme expected to be completed in three years at a cost of 22,000,000 crowns is on a more modest scale designed to provide a plate mill output of 26,000 tons a year, and for this purpose a new blooming and slabbing mill is to be erected.

Pakistan, not to be outdone by its big brother India, is contemplating the erection of a new steel mill at Malton to operate by the use of Sui gas. The plan as outlined by Mr. Ghulam Faruque, chairman of the Pakistan Development Corporation, is for the erection of a three-phased steel mill whose first phase will provide an annual capacity of 70,000 tons and after the next two phases, which will take two years to complete, annual capacity is expected to reach 500,000 tons.

Details of the expansionist plans of the British steel industry are more familiar. Its performance during the current year has admittedly been disappointing. The ban on overtime imposed by the maintenance men between May and August cost the industry nearly 500,000 tons of crude steel, and though production has since been rising rapidly it has proved impossible to fully overtake that loss. Already it is manifest that the industry's original target of 21,300,000 tons of ingots will not be reached and at the moment the shortage to many types of steel products is so acute that steel users in South Wales have sought an interview with Sir Archibald Forbes, chairman of the Iron and Steel Board, to enlist the co-operation of the Board in obtaining increased allocations of supplies.

Wants More Steel

It is a problem bristling with difficulties. The steel makers, tempted though they be by a vast overseas demand and offers of business at export prices substantially higher than the home controlled prices, have been voluntarily limiting their foreign sales to give priority to the needs of British industry.

But the fact is that the aggregate demand for steel is rising more rapidly than production and the Iron and Steel Board has approved new development projects and major adaptations of existing schemes designed to obtain an annual output of 23,500,000 tons by 1958.

The Board confesses that for some years there is likely to be a shortage of steel plate, and although plans for creating additional capacity beyond 1958 are not yet complete, "it is clear that substantial additions will be necessary".

There is a strong suspicion that the powerful buying movement derives some of its strength from the expectations that British steel prices will not much longer remain frozen at present levels. American prices were advanced as soon as the steel strike was settled and further rises are foreshadowed. The German steel industry, saddled with a ten per cent rise in the cost of coal and imported ores, in addition to increased labour costs, announced at the end of last month an all-round advance in steel prices averaging 6.34 per cent. British steel is subject to the same oppressions of rising costs and narrowing profit margins and although the Iron and Steel Board has gone no further than to admit that "prices are under constant review" the popular impression is that another advance cannot be much longer delayed.

Meanwhile, consumers are of one accord. They are buying whatever they can and piling up stocks which have already attained record proportions.

Executive Development In South African Gold Mines

IN a previous article, management on the mines of the South African goldfields was discussed, and a plea was made that three main things should be done: the mine manager's direct responsibilities should be lessened to free him for creative work, the line and staff departments should be clearly separated to enable senior production officials to concentrate on the problems of production, and effective authority should be devolved as far down the chains of command as possible.

All three of these suggestions imply that the quality and training of both line and staff officials in the senior and middle ranks of management on the mine must be of a high standard. This article is primarily concerned with the staff of the production and service departments dealing directly with underground mining, although many of its suggestions are equally applicable to the other departments on the mine.

It is largely from the universities and from technical institutes of university standing that potential recruits to the ranks of management must be drawn; and in recent years observers in many parts of the world have commented on the fact that too few young men of the right type seek university training in mining engineering. In South Africa at the present time we are more fortunate, or wiser, in this respect than many countries. The Transvaal and Orange Free State Chamber of Mines, either itself, or through the big Groups which are its members, is concerned with the greatest part of mining activity in South Africa; and in order to ensure that there will be sufficient trained mining engineers for its future needs, the Chamber has initiated a programme of sending large numbers of suitable young men to the University of the Witwatersrand. This year for instance there is a total of 179 students holding bursaries from the Chamber, and of these nearly all are registered in the Faculty of Engineering and by far the greatest number are studying for degrees in mining, mining geology or metallurgy.

In mining engineering the task of the University is to give the students a good grounding in the basic sciences and in mathematics, to teach them the principles of engineering and above all to train their minds in scientific methods of thought. By the nature of his job in the practical field of mining engineering the mining engineer's training must be a broad one. He requires a knowledge of the principles of electrical, mechanical and civil engineering, geology, metallurgy and ore dressing, and of surveying, as well as of subjects more directly concerned with actual mining. In a four-year course there is little time to do more than teach broad principles and the student upon graduation can be said to have completed only the first stage in his training.

Sustaining the Young Graduates Enthusiasm

The second stage is in the hands of the mining company for whom the new graduate works. This stage extends from the time the graduate joins the company until some ten years later when he should be ready for promotion to the ranks of senior management. In Witwatersrand terms this means until he is ready for promotion to underground manager or its equivalent. Ten years to the young graduate is a long time; looking backwards it stretches far into his childhood and looking forward, to him, almost into old age. How are these years to be spent, what reward can he expect for his labour,

and what satisfaction is he to derive from it? What scope will he have for using his brain, how will his training have benefited him and how will he be enabled to fit himself for the future?

By R. A. L. BLACK, A.R.S.M., A.M.I.M.M.

This article is by the Professor of Mining at Witwatersrand University. In it he discusses one of the critical points arising from his first article published here last week in which he emphasized that an executive development programme for junior mine officials was an essential preliminary to producing more men equipped to relieve the mine manager of some of the load of detail with which the latter is to-day generally overburdened.

All too often he is only able to answer these questions in a very unsatisfactory manner. He finds his contemporaries who went directly into mining from school have left him behind and are experienced shift bosses earning almost certainly more than he is. The fact that in a few years he will probably have caught them up and left them behind in status and salary is too remote to weigh with him. He senses antagonism all round him from his colleagues and immediate superiors; and experiences a humiliating disappointment that all his four years training at the university haven't fitted him to be a better shift boss than many who can scarcely read and write. He faces, as he sees it, long years of unremitting toil "chasing the tally", and wonders where it is going to get him. It is at this stage that many become discouraged, translate their frustration into terms of money and decide to leave the mining industry for supposedly better prospects outside it. Far too many young graduates are lost to the mining industry in this way; and although the seriousness of the situation is well recognised by many people, not enough has yet been done about it in concrete terms.

In the days before large scale mechanization and production engineering methods were introduced on the Witwatersrand, there was less standardization of mining methods and the shift bosses and mine captains carried more independent responsibility with wider scope for initiative. But the advent of mechanization, central planning, study and labour control departments, changed the nature of shift bosses' and mine captains' jobs into standardized routines, and consequently detracted from their value as training grounds for future senior officials. This is not to say that these posts are completely devoid of value for training purposes. The young graduate or future manager will normally have little or no experience of handling men, of leadership or of organizing in the adult world, and there are few better schools than the rough and tumble of a producing section of a mine for giving this experience. He can only learn to recognize bad hanging, to appreciate good track work and all the many practical details which make the difference between an efficient and an inefficient section, by being in charge of work underground. Neverthe-

less, it should take an intelligent man a matter of months rather than years to acquire the necessary practical skill and experience; and, if he is required to spend too long at it, the result will be merely boredom and frustration.

Ninety or more per cent of shift bosses' and mine captains' posts are filled by what may be termed "professionals", that is by men who will never be anything but shift bosses and mine captains. It is uneconomic and unwise to leave potential senior officials in these posts for long periods when they would be happier and more usefully employed elsewhere. Most graduates do not in any case make as good junior production officials as the better "professionals".

Planning the Graduates First Few Years

It is suggested, therefore, that a much shorter period should generally be spent by graduates as shift bosses and mine captains than is common at present; and that the remaining time before they are ready for further promotion (this is really more a matter of maturity than anything else) should be spent in occupations which are more valuable both to the individual and to the mine. The functional or specialist departments on the mines are becoming of increasing importance, and the value of the contribution which they can make to the efficiency of the mine is directly dependent on the quality of their staff. At least a proportion of the staff for these departments should be drawn from the very best brains on the mine.

The young graduate, once he has had the necessary general post-graduate training underground and served a period as a shift boss, should be encouraged to specialize in survey, planning and valuation, or in study and research, work study, personnel work, or in ventilation. He would then spend two or three years as a junior in the department of his choice, doing valuable work and studying the subject intensively.

This would be followed by a further period in the mining department as a mine captain. Part of this should be spent in short periods acting in different sections for permanent officials on leave to gain general experience, and the other part of it should be spent in one fixed section to give him experience of continuity and to enable him to prove his competence. At the end of his period as a mine captain, which for the best men need not exceed twelve months in all, he would return to his specialist department as a senior.

It is at this stage that the mine will be beginning to get the maximum benefit from the man, he will be trained in his special field and he will have experience of it in practice in the mine from the production official's point of view. In two or three years' time, when he is, say, rising thirty, the young graduate will be ready and available for promotion to underground manager or to head of his specialist department, and he can be tried out in either capacity. If he shows aptitude for the executive side he should at this time be given the opportunity to take special training in management subjects, either organized by the group head office or by a university or other outside body offering courses in industrial administration. A period of experience in the group head office would also be valuable at this stage of the man's career.

It is not denied that this type of advancement scheme is in fact practised in many instances, and many young men are receiving training in their early years very similar to that which is envisaged. But the real point is that it is not generally known by the people who should know, the young graduates themselves, that such schemes exist in the organizations for which they work. They should be put on a much more formal basis and widely publicized so that parents, headmasters and the public at large know about them, as well as people within the mining industry, in the same way as the executive development schemes of firms like I.C.I. and Lever Brothers are well-known.

The value of good formal executive development schemes, apart from their publicity value in attracting good entrants to the industry, is twofold: they make the best use of the available talent; and they enable the trainees to see a planned path of useful employment and promotion ahead of them, giving them a clear incentive to stay with the organization and give of their best. It must, of course, be made quite plain to the trainees that their progress along the path and ultimate promotion to senior posts will not be automatic but will depend on their own exertions and ability; nor should entrance to the scheme necessarily be confined to graduates, it must be open to all ranks who show the necessary qualities for success.

Sutcliffe's Manual of Belt Conveying

THIS is an attractively produced little book written by Mr. H. Streets, the technical director of Richard Sutcliffe Ltd., the pioneers of underground belt conveying. Unfortunately this publication suffers to a certain extent from a narrowness, apparent in much of the literature stemming from a business organization. This somewhat parochial approach is, however, possible excused by the word Sutcliffe being incorporated in the title, implying therefore that the manual is predominantly concerned with Sutcliffe products. This implication is borne out by the author's treatment of types of drives, idlers and structures, etc. For instance, no mention is made of mangle roller drive units, forward set wing idlers, tilting idlers, etc.

In the author's preface the hope is expressed that the student will find the book of interest. Undoubtedly the student will find this to be true but the value of the publication as a text book is lessened by a too conservative treatment. For example despite the advantages of cable belt and similar type belt conveyors no mention is made of their use or prospects.

One very desirable feature of Sutcliffe's Manual of Belt Conveyors, is an excellent division of subject-matter, and a comprehensive index embracing both descriptive and tabular detail. Illustrations are adequate and well reproduced. A chapter of particular importance is that dealing with feed and delivery chutes. Too often does a badly designed and installed chute prove a weak link in a conveyor system but attention to design features as discussed by the author should do much to facilitate the flow of mineral from belt to receptacle.

Another section of particular value is that dealing with methods of discharging material from a belt. Inverted belts and trippers are dealt with in detail as are shuttle conveyors. Calculation of catenary curves is discussed also in this section.

A chapter is devoted to miscellaneous attachments to belt conveyors, some of which are not required in mine conveying but none the less are well worthy of mention. The importance of continuous care and maintenance is dealt with at the end of the book and the causes and prevention of belt failure are treated.

The chapter on power calculations is easy to follow and throughout the book the emphasis is on the practical side of the subject from the user's point of view. Taken overall the book is very readable and covers in a short space a very wide field, and despite the slight criticisms previously levelled, Sutcliffe's Manual of Belt Conveying is a valuable contribution to contemporary mining literature.

(The book is published by W. & R. Chambers Ltd., at a price of 25s.).

MINING MISCELLANY

Deposits of pyrochlore-bearing carbonates, described as "promising," have been located in the Feira District of Northern Rhodesia.

A large-scale search for mineral deposits is being made in Tasmania where a helicopter with special detecting equipment has started a five-month aerial sweep programme.

Spanish geologists and experts are examining the possibility of exploiting deposits of bauxite and china clay in north-western Spain. The quality of the deposits is said to be very good.

Work is in progress on plans for the exploitation of deposits of cupreous iron pyrites in the Grong area of Nord-Trøndelag. If these come to fruition, Norway will be able eventually to export refined copper, instead of sending her ore abroad for refining.

The Mining Association of Japan has decided to send to Bolivia, by invitation, a team of 15 mining experts. The team will be treated on the same footing as Bolivian Government officials and will engage in geological survey, mining, ore selection and refining.

Columbia - Southern Chemicals of America and British Titan products will form a subsidiary to mine large deposits of rutile found in the Imperi chiefdom in the Bonthe district in Sierra Leone. The subsidiary will be registered in Sierra Leone.

Joy-Sullivan Ltd. have acquired a fully-equipped factory at Dronfield, near Sheffield, to improve their spares and servicing arrangements and provide increased capacity to meet expanding business.

Monographs No. 29 (1956) and 30 (1956), dealing respectively with "Thorin" and "Dithizone," have been published by Hopkin and Williams Ltd., of Chadwell Heath, Essex, England. Thorin is a reagent for thorium and also for lithium, fluoride and zirconium. Dithizone is a reagent for lead.

The Greek Ministry of Commerce is reported to have reached an agreement with the Association of Greek Mine-owners under which the Greek authorities would grant more help for the development of the country's mines. Special attention would be paid to the setting up of new facilities and to plant for the further processing of mineral products.

The Yugoslav State concern Geoistrazivanje is reported to have concluded an agreement with the Burmese Ministry of Mines under which the Yugoslavs will make a thorough examination of copper deposits in the area of Nankesan-Sinho. It will also undertake excavations in the areas of Tagaungtaung, Kawlin

and Monywa, where copper lodes are believed to exist.

The Consolidated Mining and Smelting Co. is to participate with the Power Corporation of Canada in the latter company's outstanding options to purchase 1,050,000 shares of Beaucage Mines, a prospective columbium producer. Management of the property and pilot mill at North Bay will be taken over by Cominco.

For reasons of economy, the Council of the Institution of Mining Engineers has decided to discontinue publication of the Index of Current Literature with effect from No. 118, November, 1956. The classified card index will be maintained in the Library as usual.

Contracts for the sale of blue asbestos from Wittenoom Western Australia, to overseas customers during 1957 amount to over £1,000,000 in value. This was announced by Mr. C. H. Broadhurst, director of Australian Blue Asbestos Ltd., on his return from a tour of the Far East, Europe and America.

The Liberian Government announced recently that a deposit of high grade iron ore had been proved in the north central province. It will be exploited by a newly formed "four-nation" company in which 50 per cent of the shares are held by the Liberian Government and the balance by Swedish, U.S. and Canadian interests. The company proposes to build a railway 200 miles long from the operation site to the coast, where a new harbour is to be constructed.

The Department of Industry and Commerce in Dublin have announced new regulations for the safe operation of mines and quarries. Known as the "Metalliferous Mines (General) Regulations 1956", they will become operative on November 12. The Minister has also prescribed the forms in which reports of inspections, examinations and tests are to be recorded.

Cobar Mines Ltd., with a nominal capital of £A1,000,000, and Cobar South Ltd., with a capital of £A500,000, have been registered in Australia. Both are wholly-owned subsidiaries of Broken Hill South and have been formed to take over leases and most of the plant from New Occidental Gold Mines N.L. A thorough investigation of the areas will be made.

The Eire Minister for Industry and Commerce, Mr. Norton, states that it is hoped to begin mining operations at the disused mines in Bonmahon, County Waterford, early in January. Work to develop mineral deposits at Skibbereen, County Cork; Kenmare, County Kerry, and in East Clare should begin early in the new year.

The Institution of Civil Engineers has invited members of the Institution of Mining Engineers to attend a meeting in

London on December 18, at which a paper will be presented by A. Young, H. A. Longden and B. L. Metcalf on "Post-War Developments in the Coal Mining Industry."

Full-time courses on Radioisotopes and Their Uses will be held by Department of Chemistry, Sir John Cass College, Jewry St., Aldgate, London, E.C.3., beginning on Monday, January 14, 1957. These courses, each of four weeks' duration, are a development of evening courses in radioactivity and radiochemistry established at the College in 1949.

National Coal Board scholarships in mining engineering and allied subjects have been awarded this year to 41 young men employed in the mining industry and to 40 boys outside it. During the year 59 men on National Coal Board scholarships graduated from university and passed on for further training in the industry.

British Tyre and Rubber Co. Ltd. is planning to expand its operation at Leyland, Lancashire, and has purchased a neighbouring site of 32 acres at Farington. Expanded manufacturing facilities for a number of the company's specialized industrial rubber products will be installed on the new site and these plants are expected to be operating early in 1958. It is intended to make the site the local headquarters of the company's manufacturing operations in Lancashire. The cost of the first stage of this development will be approximately £2,000,000.

Work will soon be started on the first iron smelting plant in Western Canada. A French banking and industrial group will participate. The smelter will be situated at Burmis, a station on the Canadian National Railway at the eastern end of the Crownsnest Pass and nine miles east of the coal mining town of Blairmore. It is stated that the French group has found an economical way to smelt the low grade ore in the area, which could not be processed by other existing methods.

A further increase in the exchange of students is recorded in the annual report of the International Association for the Exchange of Students for Technical Experience. Students exchanged in 1956 totalled 5,711, being an increase of 558 over 1955. Since the foundation of Laeste 28,668 students have been exchanged and provided with practical or commercial training. The employers paid sufficient to enable each student at least to cover living expenses during the training period.

The Australian mineral industry produced a record £A198,700,000 worth of minerals last year, compared with £A184,300,000 in 1954, according to the Bureau of Mineral Resources. Most of the increase in value came from higher prices, rather than from higher tonnages. Mineral exports in 1955 were worth £A71,500,000 against £A58,000,000

in the previous year. The increase was due to considerably larger gold shipments, higher prices for the base metals, and, to a lesser extent, to increased exports of rutile and scheelite.

The Cerro de Pasco Corporation has called for a special meeting of stockholders on December 19 to vote on a plan to realign its corporate structure. The principal feature of the plan is conveyance of the Peruvian assets to a wholly-owned subsidiary, to be organized under the laws of the State of Delaware. The company indicated that this would result in tax savings. All of Cerro de Pasco's mining operations are in Peru, but in recent years the company has been diversifying its activities by the acquisition of manufacturing subsidiaries in the U.S. and Peru.

New arrangements for awards for post-graduate study have been announced by the Ministry of Education and the Department of Scientific and Industrial Research, who have recently concluded, in consultation with the Committee of Vice-Chancellors and Principals of Universities of the U.K., a full review of the present system. From 1957-58, the D.S.I.R. will offer a considerably increased number of competitive post-graduate awards in science and technology. These awards will be available not only for training in research but also for advanced instructional courses lasting more than six months. They will be tenable at technical colleges as well as at universities.

Dr. W. D. Harding, veteran geologist of the Ontario Department of Mines, has announced that the first two of his series of classes for prospectors this year will be held at Armstrong from November 23 to 30 and at Geraldton from December 3 to 8. Arrangements have not yet been completed for the rest of the winter schedule of lectures. Dr. Harding has conducted these courses annually since 1936 except during the war when they were suspended for several years. Instruction, for which no charge is made, is open to anyone. Each individual attending the classes is given about 70 small mineral or rock specimens for study. It is estimated that over the years more than 1,250,000 samples have been distributed.

Associated Cement Companies of Bombay, Vickers of London, and Babcock and Wilcox of London have concluded arrangements to form a company to be known as A.C.C.-Vickers-Babcock (Private). It is planned to build a heavy-engineering works in the vicinity of Durgapur, West Bengal. The initial capital involved is about £8,000,000 and the building, as at present envisaged, will take about three years to complete. Construction will start as soon as the approval of the Indian Government has been obtained. Among the products of the factory will be mining machinery, cement-making machinery, large pumps, heavy gears, steam generating plant of all types, pressure vessels, cranes and mechanical equipment.

The Export Services Branch of the U.K. Board of Trade has received a few copies of the latest edition of the brochure on S.E.M.K.O. (Swedish Bureau for Testing Electrical Equipment), which is responsible under the

Swedish Board of Trade for the approval of all electrical apparatus, whether domestic or imported, which is sold in the Swedish market. Copies of the brochure, which is entitled "Contact with S.E.M.K.O." (translated into English), and also copies of the S.E.M.K.O. specifications (no English translations of these are available) may be obtained on loan from the Export Services Branch (Tariff Section), Room 608, Lacon House, Theobalds Road, London, W.C.1 (Telephone, Chancery 4411, extension 682), to whom all enquiries should be addressed. (Ref.: CRE/2210/56).

Asbestos is considered to be the most important non-metallic mineral in Finland, where numerous small deposits of anthrophyllite asbestos are found. Early in 1955, a deposit of good-quality chrysotile was found in the Nattastunturi area in Finnish Lapland. In mid-1955 a geological study of this find was made by the Suomen Minerality Oy in collaboration with the Government Institute of Geological Research, but no further information on the new deposit was released. Anthrophyllite asbestos is mined at Paakkila in the commune of Tuusniemi, where both underground and surface mining methods are used, and also by the open pit method at Maljasalmi in the commune of Kuusjarvi. A new milling plant at Paakkila is expected to increase output of crude asbestos at this mine to about 12,000 tonnes a year. Finland, although an exporter of asbestos and asbestos manufactures, depends on foreign markets for long fibre.

PERSONAL

Mr. T. Marks has been appointed to the board of Tati Goldfields. Mr. E. Jacobson has left the board.

Mr. Arthur L. Thomas has been appointed a director of Tehidy Minerals in place of Major T. M. Rogers, who has resigned from the board.

Mr. Christopher J. Holland-Martin, M.P., has accepted an invitation to join the boards of the Zambia Exploring Co. and its subsidiary, the Zambia Investment Co.

Mr. S. G. Gates, chairman, and Mr. P. R. Scutt, managing director of Tecalemit Ltd., have left on an extensive business trip to Australia. While there they will visit the Tecalemit factory at Adelaide. Mr. Gates will return via the U.S., where he will spend about three weeks, and Mr. Scutt will return via India.

The annual general meeting of the Institution of Mining Engineers will be held in London on January 31, 1957. Dates of other forthcoming meetings are as follows: The Midland Institute of Mining Engineers, December 13, 1956; the Mining Institute of Scotland, November 21; The North of England Institute of Mining and Mechanical Engineers, December 1; The North Staffordshire Institute of Mining Engineers, November 26.

By Order-in-Council dated October 31, 1956, Her Majesty approved November 7

to be the date on which the Department of Scientific and Industrial Research Act, 1956, should come into force. The members of the new Council are Sir Harry Jephcott (chairman), Sir Eric Ashby, Prof. C. E. H. Bawn, Sir Hugh Beaver, Prof. P. M. S. Blackett, Mr. H. Douglass, Sir Walter Drummond, Mr. W. L. Heywood, Dr. Willis Jackson, Sir Philip Johnson, and Professor E. A. G. Robinson. Dr. H. W. Melville, secretary of the present Advisory Council, will be secretary of the new Council.

Mr. John R. Govett has been appointed president of the Consolidated Zinc Corporation as from December 31. From that date he will relinquish the chairmanship of the company, but will retain his seat on the board. He will also relinquish the chairmanship of New Broken Hill Consolidated from December 31, but will remain a director. Mr. L. B. Robinson, a vice-chairman and joint managing director of Consolidated from December 31, but will remain a director. Mr. L. B. Robinson, a vice-chairman and joint managing director of Consolidated Zinc, will succeed Mr. Govett as chairman of both companies.

The 72nd Annual Dinner of the Royal School of Mines Association was held on Tuesday of this week at the Apothecaries' Hall, London, under the presidency of Mr. Rex Lambert. Among the guests at this agreeable function were Mr. A. M. Holbein (chairman, Delegacy, City and Guilds College) who proposed the toast of The Association, Sir Anthony Hawke (Common Serjeant) Professor C. W. Dannatt (President, Institution of Mining and Metallurgy), R. P. Baulkwill, C.B.E. (Public Trustee), Professor D. Williams (Dean, Royal School of Mines), R. Groves (Master of Dulwich College), B. W. Kerrigan (secretary of the Institution of Mining and Metallurgy together with the President and Honorary Secretary of the R.C.S. Association, and the President, Vice-President, and Honorary Secretary of the R.S.M. Union.

AGENCIES WANTED

Mr. W. C. Wade, industrial representative for Mumford Medland Ltd., 576 Wall Street, Winnipeg, has told the U.K. Trade Commissioner at Winnipeg that his company wishes to represent a U.K. manufacturer of stationary air compressors ranging from 2 c.f.m. to 1,500 c.f.m. The company would also consider handling a U.K. portable range, provided it can retain a U.S. agency which it already holds. Manufacturers interested should write direct to Mr. Wade, notifying the U.K. Trade Commissioner, 403 Royal Bank Building, 504 Main Street, Winnipeg 2, that they have done so. B.O.T. Ref.: E.S.B./284/12/56. Telephone enquiries to Chancery 4411, extension 776.

CONTRACTS AND TENDERS

A new steam-generating plant incorporating a Benson "once through" forced circulation boiler is to be designed and built by Simon-Carves for the Steel Company of Wales' Margam Steelworks in South Wales. Believed to be the first Benson "once through" boiler to be ordered in the U.K., this plant will generate 240,000 lb. of steam per hour at 3,300 p.s.i. and a temperature of 1,060 deg. F with reheat to 840 deg. F.

Technical Briefs

Use of Organotin Compounds in Timber Preservation

A striking demonstration of the value of organotin compounds as a fungicide was referred to by Dr. E. S. Hedges, Director of the International Tin Research Council, in a recent lecture to a joint meeting of the Institution of Mechanical Engineers and the Institution of Production Engineers at the Cambridge School of Mines.

Dr. Hedges pointed out that three years ago pit props which had been treated with organotin compounds were installed in the Geevor tin mines. Alongside them, to act as controls, a number of untreated pit props were also installed. These pit props were put to use at the great depth of 1,200 ft. where there are very testing conditions of dampness.

After three years of hard use the treated props were still as good as new, while the untreated control props rotted away after 18 months and had to be replaced. Dr. Hedges forecast many new uses for organotin compounds.

PLATING COPPER ON ALUMINIUM

Dr. J. T. N. Atkinson, of Canada's Naval Research Establishment, has developed a new method of electroplating copper on aluminium. This is claimed to represent an important advance in the use of aluminium for electrical applications in view of certain difficulties hitherto experienced in joining aluminium to other metals. Copper-plated aluminium, however, can be soldered readily and otherwise duplicates copper's favourable properties. The new development may also prove useful in copper plating steel and other metals, in which case it would have the further advantage that less dangerous chemicals can be substituted for the copper cyanide solutions normally employed by industry.

NEW ZINC PLATING PROCESS

Conversion Chemical Corp., United States, has developed a compound and method which, it claims, produce in a one-dip process mirror-bright surfaces on zinc plate with no brighteners in the zinc bath. The compound is packaged in disposable drums of either fibre or steel with polyethylene envelope liners.

The company claims that the process operates satisfactorily in the temperature range 90-110 deg. F. and that no ventilation is required. The finished surface offers corrosion protection and unusual resistance to staining and fingerprints. Savings of over 50 per cent compared with current methods are claimed.

SILICON RECTIFIER DEVELOPMENT

A series of low-power silicon junction rectifiers which are said to offer many advantages where high temperature working and small size are required have now been developed by the research laboratory of the British Thomson-Houston Company at Rugby.

It is claimed that a maximum junction temperature of 200 deg. C. can be obtained with these silicon rectifiers. The units are being made available in experimental quantities. This allows them to be operated at ambient temperatures up to 175 deg. C. and inverse voltages up to 300 volts are possible at these temperatures. At lower junction temperatures of the order of 120 deg. C., a higher inverse voltage can be obtained and units are being made that can handle up to 400 volts.

Silicon rectifier units can also be used as voltage reference (Zener Diode) units operating in the range of 4 to 8 volts and units of this type suitable for junction temperatures up to 250 deg. C. have been developed at the company's laboratories.

All these experimental silicon rectifiers are hermetically sealed in special capsules by means of a projection weld. They are being made in three forms—wire ended, stud mounted with top flying lead, and stud mounted with soldering tag.

SILICOMANGANESE FROM OFF-GRADE MATERIALS

Laboratory and pilot-plant tests indicate that silicomanganese for alloy steels can be made from certain off-grade Montana ores. These tests are described in a U.S. Bureau of Mines technical report released recently by the U.S. Department of the Interior.

The studies were conducted at the Bureau's Northwest Electro-development Laboratory. Samples came from the waste-tailings dump of the Domestic Manganese and Development Co., at Butte, and from the Nettie mine in the Butte-Philipsburg area. In flotation and electric-smelting tests, recovery of manganese and the quality of the silicomanganese product were described as good.

Because of the preliminary nature of the tests and the smallness of the samples, the research proved only the technical feasibility of the processes. The Bureau hopes to conduct further experimentation, using similar materials from other deposits.

IRON ORE REDUCTION BY HYDROGEN

A process for reducing iron ore by hydrogen instead of coke has been proved on the laboratory scale by Hydrocarbon Research Inc. in collaboration with the Bethlehem Steel Co. Detailed engineering studies are now proceeding for a full scale plant.

Reduction is carried out in continuous fluidization at about 900 deg. F. and 400 psi. The hydrogen is produced by the Texaco HRI partial oxidation process and is expected to cost less per unit of metallic iron than the coke consumed in conventional blast furnaces. Though most of the impurities in the original ore remain in the iron produced, none are introduced as are sulphur and carbon when using coke. The iron produced can replace scrap in oxygen converters.

PUBLIC WORKS EXHIBITION

It proved impossible last week to describe in the space available those products of interest to the mining industry that were displayed at the Public Works and Municipal Services Exhibition, held at Olympia between November 12 and 17. Those products that have applications to mining accordingly are presented herewith.

On Stand 116, National Hall, the most powerful diesel crawler tractor in the world—the Caterpillar D9 with increased horsepower—was displayed by the U.K. Caterpillar and Hyster Dealers. The power of the D9's turbo-charged engine has just been increased from 286 h.p. to 320 h.p. and the machine at Olympia was the first to be exhibited in this country. There are two models available, the torque converter and direct drive types, the latter model appearing at Olympia. A direct drive Caterpillar D8 diesel crawler tractor was also featured on Stand 116, together with a No. 955 Traxcavator and the following Hyster fork lift trucks: RC-150, HC-50, ZA-80, QN-20 and YC-40.

International Harvester Co. of Great Britain, Ltd., although accommodated with an increased floor area, were again forced to limit the range of tractors and equipment displayed. They expected, however, to feature almost the entire range of their British-made product, units made to match the International LTD-6 50.5 B.H.P. crawler tractor. These include bullgraders, scrapers, front and overhead loading shovels, winches and pipebooms. For these various applications two were types of tractor to be displayed, the regular four-roller track frame type with equalizer spring, and the 5-roller extended rigid track frame type. Diesel models only were used although distillate and petrol engines are also available, all of International Harvester design and manufacture.

On Stand 27, Grand Hall, Thomas W. Ward Ltd. showed a Smith 8 universal excavator, a Fowler Challenger 2 diesel crawler tractor, a Weatherill loading shovel and other equipments.

Nordberg Manufacturing Co. displayed an intermediate crusher together with a standard Symons machine on Stand 39, Grand Hall. Other exhibits included a V-screen for fine separations, a new Symons heavy duty rod grizzly, and various working models.

On Stand 165, Empire Hall, The Lead Wool Co. Ltd. showed a range of two stage portable compressors represented by the ACD.210 four breaker machine and the ACD.115 two breaker machine. Other tools and appliances were displayed.

Vacuum/pressure impregnation of timber with Tanolith C non-leachable timber preservative and pyrolith flame retardant preservative were displayed by Hickson's Timber Impregnation Co. (G.B.) Ltd. on Stand 216, Grand Hall Gallery.

On Stand 271, National Hall Gallery, Revol, Ltd. demonstrated the use of Voler compounds on gear driven machines, as well as belt treatments and lubricants.

Metals and Minerals

Metals in the Automotive Industries

Now that supply difficulties are easing and the return of more competitive trading conditions has been brought appreciably nearer, the outlook for producers of aluminium, nickel and stainless steel will be very greatly influenced by the progress of the automotive industries, which are among the largest commercial consumers of these materials.

According to Mr. I. W. Wilson, president of Alcoa, aluminium productive capacity may have temporarily exceeded demand for the metal, and the industry is embarking on an intensive merchandising programme to expand usage and hence sales. "Instead of being plagued with the problems of attempting to meet demand, as in the past," said Mr. Wilson, "manufacturers should at last be able to design and use aluminium in new applications, with confidence that the supply will be adequate."

Mr. Wilson cited several entirely new fields which offer tremendous problems for large tonnage applications, among them being containers, packing, residential building uses, telephone exchange, cable, highway applications, heat exchangers, condensers, instruments, tools and fasteners. A rapid upswing in the amount of aluminium used in refrigerators has also been reported.

At the same time aluminium producers seek to expand consumption in industries which have long been among the principal consumers of aluminium, but not in the volume that would be possible when an ample supply of metal was readily available.

Among the expanding markets where further great gains are anticipated is the automotive industry. Last year about 90,000 tons of aluminium were consumed in the U.S. for passenger cars alone. Truck trailer manufacturers were estimated as having required an additional 40,000 tons. Despite the drop in total automotive output during the current year, it is expected that the relative ratio will not apply to consumption of light metal. A survey by Alcoa issued earlier this year revealed that an average of 35 lb. of aluminium would be consumed per vehicle.

In most cases U.S. motor car manufacturers are now using, to varying degrees, more aluminium, particularly in trim and accessories. In 1955, Ford was using from 14 to 17 lb. per standard unit. Installation of the automatic transmission added another 17 lb. per unit. This year Ford is adding to aluminium usage such items as scuff plates for the door sills, on front fender panels, door panels, and rear quarter panels. Chevrolet is the largest volume user of aluminium on its 1957 models, its aluminium ornamentation being 300 per cent greater than in previous years. This division of General Motors also uses the largest single aluminium die casting and makes extensive use of gold anodized aluminium. Preliminary surveys indicate that the average Chrysler model for 1957 will use 10 lb. more aluminium than the 1955 models. An executive of Reynolds has forecast that the total increase in volume

of aluminium requirements by the U.S. motor car industry next year is likely to be double the 1955 consumption.

An improvement in the nickel situation has been forecast by the vice-president of the Sharon Steel Company, Mr. David B. Carson, who said that the tight situation in the market would improve after the first of the year because Government stockpiles had almost reached their goals and more metal would be released for industrial use.

A great potential is foreseen for the increased use of stainless steel by the automotive industry, notably in connection with the adoption of the gas turbine for power units. Other possible future uses for stainless would be for radiators, mufflers, tail pipes and possibly bumpers. It is estimated that use of stainless in 1957 car production will be higher by about 10 to 12 per cent.

Mr. Carson expressed little concern over the possibility that increased aluminium consumption by the car industry might be at the expense of stainless steel. Pointing out that each metal had uses for which it was the most suitable, he stated that both would find greater use in car manufacture.

*

Kaiser Aluminium plans to build an aluminium reduction plant by 1961 in Douglas County, Washington, if a Columbia River hydro-electric project is completed. The \$110,000,000 dam would be financed by revenue bonds, backed by the Douglas County Public Utility District's power contracts with Kaiser. Its ultimate capacity would be 483,000 kW., with an annual output of 3,084,000 kW. The aluminium plant would require 150,000 kW. of power.

*

The Office of Defence Mobilization has ruled out direct government loans as an incentive to industry for increased U.S. nickel supplies. Officials state that such loans are not warranted in view of indications that incentives available are sufficient to bring about increased supplies.

COUNCIL FOR INDIAN MICA

The Government has set up an export promotion council for mica, writes our Correspondent in India. It comprises the Joint Chief Controller of Imports and Exports, Calcutta (chairman), representatives of the Ministry of Natural Resources and Scientific Research, Government of India, and the State Governments of Bihar, Rajasthan and Andhra. The mica trade in these three States has made contributions towards the establishment of the Council.

In order to maintain and increase exports of mica, mica manufactures and by-products of the mica industry, the Council will undertake market studies in foreign countries; send out trade missions; appoint representatives, agents or correspondents in foreign markets; collect and disseminate among exporters statistical and other information regarding the export trade in mica. It will also

try to maintain standards of quality and packing in respect of mica exports.

FUEL ELEMENTS FOR CANADA

President Eisenhower recently announced that 11,000 lb. of Uranium 235 (valued at about \$11,000 per lb.) would be made available to the new International Atomic Agency. He also said that the U.S. would match the uranium contributions of all other nations to the international uranium supply.

It is noteworthy that the first contract calling exclusively for the shipment to another country of atomic fuel elements fabricated by American private industry under President Eisenhower's "atoms for peace" programme was signed early this month by Atomic Energy of Canada Ltd. and Sylvania Electric Products Inc. The fuel elements are for use in the Canadian government's new test reactor at Chalk River, Ont.

QUICKSILVER FIRMER

Although the price of quicksilver has remained stable for several weeks, a firmer trend is reported in the London market. Now that the recent government offerings have largely been disposed of, stocks are held mainly by the representatives of the Spanish and Italian producers and competition from sundry dealers is consequently less acute. The chief sources of supply are, of course, situated on the right side of the canal for the principal markets, but India and the Far East are not so fortunately situated, and we understand that considerable business is being done with purchasers in these countries who are buying ahead.

BEACH SAND MINERALS

India's reserves of ilmenite and rutile sands are of the order of 300,000,000-350,000,000 tons stated Shri K. D. Malaviya, Union Minister for Natural Resources, in the Lok Sabha. The Minister added that in Travancore-Cochin six factories had been set up to exploit local deposits. In Bombay the State Government had granted five mining leases and four prospecting licences for the development and working of the heavy mineral-bearing sands.

SOVIET MANGANESE FIND

A new manganese ore deposit in Central Siberia has been reported. It lies between Stalinsk and Mezhdurechensk, within easy reach of the industrial region of Kuznetsk. The report claims that more than 50 per cent of the ore, which is of the carbonate type, can be worked by the open cast method. Assuming that all ores down to a 20 per cent manganese content can be exploited by the introduction of a suitable method, the deposit is expected to yield some 25,000,000-30,000,000 tons.

COPPER • TIN • LEAD • ZINC

COPPER LOOKS TO 1957

Copper has had a quiet week in comparison with experiences of the recent past. In the United States the price of both producers and custom smelters has remained unchanged at 36 c. per lb., but demand for foreign copper for export was weak enough to cause a fall to around 35½ c. Scrap copper has also shaded slightly. The brass mills are still reporting only moderate request for their products and, according to the *Wall Street Journal*, have now given up hope of any substantial gain in business this year; they are looking for a recovery around the turn of the year when orders for first quarter delivery will be placed; they are also expecting that consumers' ability to run down inventories will by then be exhausted. Brass mills are still operating at only 60-70 per cent capacity and have no worthwhile backlog of unfilled orders; new business is apparently just about keeping pace with the current rate of delivery. Against this still rather gloomy outlook there is the news that car dealers are completely clear of the 1956 models and that orders for the 1957 models are said to be good.

In London, copper values have declined over the week simply because the news—if not better—is no worse. It still remains the case that, if demand is not particularly brisk, nobody seems in a great hurry to sell. The problem that is looming up is not whether industry will have enough copper; but rather whether it will have enough fuel.

Perhaps the most interesting news of the week has been supplied by R.S.T. First it raised its price by £15 a ton c.i.f. for United Kingdom consumers of electrolytic wirebars and the figure is now £280 a ton. This price is not far out of line with L.M.E. quotations (which are fairly stable) or with the price ruling in the United States. The fact that world values are now more in line than they have been for many months past may have some bearing on the news that R.S.T. is discussing with Rhoanglo the question of the pricing of Rhodesian copper to United Kingdom consumers. There could hardly be a more propitious time for instituting a system of controlled prices for copper but that, of course, does not alter the merits of price fixing. There is no news of the course of discussions and no information as to what R.S.T. will do if Rhoanglo continues to use the L.M.E. price.

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From Chile it is reported that workers at Chuquicamata have decided to cut out holiday working and overtime and to limit Sunday working. Anaconda says that these steps would cut the mine's output by 15 per cent. Recently the company announced that it had no plan for cutting output in Chile in spite of cuts in American output and it also stated that in October, Chuquicamata, produced a record 50,000,000 lb. The Chilean government has called on the workers to continue normal working to fulfill contracts.

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Meanwhile Canada has ordered a tightening of export controls on scrap copper in the belief that in the next few

weeks and months overseas buying will be very strong. There is no move yet in the United States for a similar tightening up but the demands of the scrap exporters for bigger export quotas in the last quarter may well be resisted.

NO CANAL FOR TIN

Price-wise tin moved steadily downward in the United States last week to 108.37 c. per lb. for spot Straits metal. The price had rocketed to panic levels during the Middle Eastern fighting and with hostilities at an end a more optimistic view of things has prevailed. The result of the American election has also had its effect on prices, partly because of the confidence put in Mr. Eisenhower by most Americans and partly because all realize that with the elections over the United States is again free to assume a more vigorous foreign policy. Yet the downward trend has been followed in spite of bullish influences. The news of the physical state of the canal has, in fact, got steadily worse and with 30 ships in the channel the period of blockage may easily exceed six months. The rumours about the impending arrival of Russian "volunteers" have become more menacing. The price rise may have been overdone but it would be wrong to assume from the downturn that the prospect for easy supplies of tin have improved. These sentiments apparently accounted for a check on Wednesday to 109 c.

Meanwhile in the United States, tinplate continues to move off into consumption at a satisfactory rate and new bookings are good, in spite of the recent price rise.

★

Singapore and the Federation together exported 6,507 tons in October against 6,545 tons in September; of the October total the United Kingdom took only 20 tons against 4,286 tons by the United States and 834 tons by Europe. The jump in price and the widening back are thus partly explained. In the first 10 months of the year the United States took over half of the Federation's exports of 61,983 tons.

LEAD CONTINUES STEADY

Lead buying has continued steady in the United States at 16 c. per lb. and the market has not been much affected by the price movements in Europe. Sales are being made for December delivery at a flat price, however, by some producers. Mr. Davis, director of business research for Goodyear Tyre and Rubber, has predicted that new car sales in 1957 will be around 6,800,000 against 6,000,000 this year. Battery replacements are expected to rise from 26,100,000 this year to 27,400,000 in 1957.

ZINC AND THE STOCKPILE

Zinc has remained unchanged in the United States at 13.50 c. per lb. East St. Louis for prime western grade. Demand for galvanizing grades is said to be increasing although the diecasters are still disappointing. In the first 9 months of the year deliveries of galvanized sheets

were up to 2,185,056 tons against 2,087,155 tons in the same period of 1955. But for the midsummer strike the gain would have been greater. However, deliveries in September were 40,000 tons down against September, 1955.

★

The slab zinc statistics for October go some way toward illustrating the effect of stockpiling. Output rose from 90,235 tons in September to 93,493 tons in October; this was a record for any month. But deliveries to domestic consumers were also well up from 73,142 tons in September to 84,991 tons in October. This was not a record but compares favourably with the early months of the year when demand was good. The government took 21,392 tons against 18,301 tons in September, and only 1,942 tons in October last year when the industry was booming. Thus in spite of the record output stocks fell by 13,355 tons to 88,810 tons. This figure is still very burdensome however, and will have to be reduced further. Stockpiling of domestic metal can continue on present authority till around the end of the year and of foreign metal till well after. But it has to be remembered that October stockpiling was the highest figure for over six years.

The London Metal Market

(By Our L.M.E. Correspondent)

Whilst the market still remains susceptible to any developments in international affairs, the present uncertainty surrounding the next stage in the efforts to find a satisfactory solution to the Middle East problem has been reflected in the comparatively quiet conditions which have prevailed on the Exchange. As far as copper is concerned it would appear that consumers in Europe generally are reasonably well covered, and in the U.K. the shipping problems referred to last week have to some extent been relieved by the metal released from the British government's stockpile which is commencing to come onto the market. It has been suggested that this source might produce 7,000 tons a month, which, provided there are no political developments of a nature serious enough to halt the flow, should be sufficient to avoid any scarcity in the near future. The R.S.T. price was increased by £15 a ton from November 12 to £280 per ton c.i.f. U.K., electrolytic wirebar basis.

The price fluctuations in the tin market have been on a narrower scale than previously but, nevertheless, it probably remains the most sensitive to the daily news. It may be noted that the back-wardation has narrowed to approximately £35 per ton in spite of the latest reports on the extent to which the Suez Canal is blocked and the estimates of the time it will take place before navigation can be resumed. On Thursday morning the Eastern price was equivalent to £282½ per ton c.i.f. Europe.

Lead and zinc valuations have moved higher, and in both metals the back-wardation has tended to widen thereby reflecting what would appear to be a technical rather than a physical shortage in offerings of metal for early delivery. There must inevitably be some delay in the arrivals of both lead and zinc metal and zinc concentrates from Australia, but it is not anticipated that any serious scarcity will develop. Deliveries of zinc from Europe against the American barter transactions are proceeding, and it is reported that these may be continued.

Closing prices and turnovers are given in the table overleaf.

THE WEEK ON THE L.M.E.

	November 8		November 15	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	\$285½	\$286	\$281	\$281½
Three months . .	\$286½	\$287	\$282½	\$283
Settlement . . .		\$286		\$281½
Week's turnover		7,525 tons		4,275 tons
LEAD				
Current ¼ month	\$118½	\$118½	\$120½	\$121½
Three months . .	\$116½	\$117	\$118½	\$118½
Week's turnover		3,050 tons		4,325 tons
TIN				
Cash	\$850	\$855	\$852½	\$855
Three months . .	\$812½	\$815	\$825	\$827½
Settlement . . .		\$855		\$855
Week's turnover		750 tons		735 tons
ZINC				
Current ¼ month	\$100	\$100½	\$101½	\$101½
Three months . .	\$96½	\$97	\$97½	\$97½
Week's turnover		3,875 tons		3,700 tons

Aluminium, 99.5 %, £198 10s. per ton

Antimony—English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. 1b. nom.
Cadmium 12s. 0d. lb.
Caesium (99% net), £13 18s. 1b. delivered U.K.
Chromium, 7s. 1d. lb.
Cobalt, 21s. lb.
Copper, £28 10s. per ton

Bismuth	60% <i>Rs. 3d. lb. e.i.f.</i> 30% <i>Sa. 5d. lb. e.i.f.</i>
Chrome Ore—	
Rhodesian Metallurgical (semfriable) 48%	£16 15s. 0d. per ton c.i.f.
" Hard Lumpy (45%)	£16 15s. 0d. per ton c.i.f.
" Refractory 40%	£10 15s. 0d. per ton c.i.f.
" Smalls 42%	£13 15s. 0d. per ton c.i.f.
Bauchistan	£17 5s. 0d. per ton c.i.f.
Columbite, 65% combined oxides, high grade	190s./305s. per unit
Lithium Ore —	
Petalite min. 34% Li ₂ O	£8-£10 per ton f.o.b. Beira
Lepidolite min. 34% Li ₂ O	£8-£10 per ton f.o.b. Beira
Amblygonite basis 7% Li ₂ O	£35-£40 per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Molybdenite (85% basis)	8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore —	
Rutile 95/97% TiO ₂	£102 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO ₂	£11 per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	228s. 6d./233s. 6d. per unit e.i.f.
Manganese Ore Indian	
Europe (46%-48%) basis 125s. freight	137d. nom. per unit c.i.f.
Manganese Ore (43%-45%)	115d. nom. per unit c.i.f.
Manganese Ore (38%-40%)	110d. nom. per unit. (including duty)
Vanadium —	
Fused oxide 90-95% V ₂ O ₅	£124-£131 per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO ₂)	£20 per ton c.i.f.
Zirconium Oxide — Calcined Opacifer	£325 1-ton, delivered

Germanium, 99.99%, Ge.kilo lots 3s. 4d. per gram
Gold, 251s. 5½d.
Iridium, £29/31 oz.
Lanthanum (98/99%) 15s. per gram
Lead, £121 5s. per ton
Manganese Metal (96% - 98%) £259/£265 according
to quantity
Magnesium, 2s. 4d. lb
Nickel, 99.5% (home trade) £519 per ton
Osmium, £24/27 oz. nom
Osmiridium, nom.

Palladium, £8 0s./£8 10s. oz.
Platinum U.K. and Empire Refined £34/£35 oz.
Imported £37 15s. nom.
Quicksilver, £83 10s. - £84 10s., ex-warehouse
Rhodium, £42. oz.
Ruthenium, £15/£17 oz.
Selenium, 112s. nom. per lb.
Silver, 81½d. f.o.z. spot and 80½d
Tellurium, 15s./16s. lb.
Tin, £855 per ton
Zinc, £101 15s. per ton

Pinnace	Price Nov. 14	+ or - on week
African & European ..	57/6	-7½d
Anglo-American Corp'n.	7¼	+8
Anglo-French ..	21/9
Anglo-Transvaal Consol.	26/3
Central Mining (£1 shrs.)	52/10½	-10½d
Consolidated O'fields ..	59/-XD	+2/9
Consol. Mines Selection	32/6	-7¾d
East Rand Consols ..	1/9
General Mining ..	71/3	-1/3
H. E. Prop.	8/4½ND
Johannes ..	41/-
Rand Mines ..	65/-	-7¼d
Rand Selection ..	35/-
Union Corporation ..	36/3	+1½
Vereeniging Estates ..	5/6
Write ..	32/6	-9d
West Wits ..	32/9
Rand Gold
Blyvoors ..	22/3	+6d
Brakpan ..	6/3	+6d
Buffelsfontein ..	25/10½	-9d
City Deep ..	11/9	+1¼d
Consol. Main Reef ..	16/4½	+10d
Craig ..	33/11	+7½d
Dagaa ..	36/10½	+7d
Dominion Reefs ..	16/6	-9d
Doomfontein ..	20/1½	+3d
Durban Deep ..	27/6	+1/10½
E. Champs ..	3/3
E. Dagas ..	8/3
F. Goudk. (E. units) ..	30/-	+9d
G. Rand Props ..	45/-
Goduld ..	72/6
Govt. Areas ..	3/7½	+4½d
Grootevlei ..	18/7½	+3d
Hartebeestfontein ..	41/7½	+3d
Klaserus ..	10/1½	-3d
Laipeira Vie ..	10/1½	-3d
Marielave ..	18/1½	-3d
New Kleinfontein ..	4/3	+7½d
New Pioneer ..	14/3
Randfontein ..	31/9	-1/3
Robinson Deep ..	7/9	-6d
Rose Deep ..	8/6
Simmer & Jack ..	4/1½	-11d
S.A. Lands ..	24/4½	+7½d
Springs ..	2/4½	+1½d
Stilfontein ..	25/6
Sub Nigel ..	22/6	+7½d
Val Reef ..	27/10½	+1½d
Van Dyk ..	13/1½	+4½d
Venture ..	16/1½	+1½d
Vlakfontein ..	16/1½
Vogelaarslaabuit ..	13/6	+7½d
Wet Driefontein ..	4½	+½
Price Nov. 14	on week	
Rand Gold cont'd.		
W. Rand Consolidated ..	28/9
Western Reefs ..	28/3	+3d
O.F.S. Gold
Freddies ..	7/-	-3d
Freddies Consolidated ..	3/9
F.S. Geduld ..	76/3	-3/1½
Geoffries ..	3/9	-2/1½
Harmony ..	25/3	-1½d
Loraine ..	4/9	-6d
Nydenburg Estates ..	14/-	-6d
Merriesspruit ..	4/7½	+1½d
Middle Wits ..	8/-	-7½d
Ofatts ..	51/3	+1½d
President Brand ..	55/7½	-7½d
President Steyn ..	30/-
St. Helena ..	26/3
Virginia Ord. ..	9/-	+1½d
Welkom ..	15/3	-1½d
Western Holdings ..	69/4½	-1/3
West African Gold
Amalgamated Banket ..	3/6	-1½d
Ariston ..	1/3	-1½d
Ashtanti ..	14/4½	-1½d
Bibiani ..	1/10½	-1½d
Bremang ..	1/3	-1½d
G.C. Main Reef ..	1/6	-3d
Konoongo ..	1/4½	-3d
Marlu ..	2d	+½d
Taqah ..	10½ XRC	-3d
Western Selection ..	6/9
Australian Gold
Gold Mines of Kallgoortie ..	13/7½	+1½d
Great Boulder Prop. ..	12/-
Lake View & Star ..	16/3xd
Mount Morgan ..	17/3	-6d
North Cape Quartz ..	6/1½	-6d
Sons of Gwalia ..	1/9
Western Mining ..	10/6	-1½d
Miscellaneous Gold
Cam & Motor ..	8/1½	+1½d
Champion Reef ..	12/3	-3d
Falcon Mines ..	7/9	-1½d
Globe & Phoenix ..	23/-
Metopa ..	3/3
Myrcore ..	10/6
Nundydooop ..	17/1½	-3d
St. John d'E Rey ..	54/-	-6d
Zams ..	47/6	-1/3
Price Nov. 14	on week	
Diamonds and Platinum
Anglo American Inv.. .	9	XD +1/6
Casta ..	25/4½
Cons. Diam. of S.W.A. .	10/9
De Beers Defd. Regd. .	5
De Beers Pfd. Regd. .	13½
Pots Platinum ..	13/9
Waterfall ..	24/-
Copper
Bankcroft ..	46/9	-1/3
Chartered ..	69/6	-9d
Eperanza ..	2/6	-1½d
Lake George ..	8½	+1½d
Messina ..	8½	+1½d
Nchanga ..	13½	+1½d
Rhod. Anglo-American ..	4/5	-3½d
Rhod. Katanga ..	4/5	-3½d
Rhodesian Selection ..	47/9	+2½
Rhokana ..	40½	+1½d
Rio Tinto ..	83/9
Roan Antelope ..	26/4½	+10½d
Selection Trust ..	4½	+½
Tanks ..	7½	+½
Tharisa Sulphur Br. ..	6	-½
Tin (Eastern)

Mining Finance

Kansanshi Comes Into Production

In these uncertain times, it would be a difficult task to select many investments, which, if they have been bought this year would show an 80 per cent capital profit. Yet this is the case in respect of the £1 shares of Rhodesia-Katanga—which owns 35½ per cent of the developing Kansanshi Copper Mine situated in Northern Rhodesia. After touching a low point of 24s. 9d., and later rising as high as 58s., Rho-Kats are currently quoted at around 45s. It is particularly noteworthy that this advance has been achieved in the face of a downward copper metal price and share trend, together with falls which have taken place on Wall Street. Here indeed is an example of how a special situation share can move against the market.

Things have evidently been going well at Kansanshi recently, for it is now disclosed that the production stage has been reached on schedule, and that small consignments of copper oxide ore are being sent for smelting at Nkana. It is also revealed that the company's sulphide ore concentration plant has been started up—abeit on a limited scale—to treat tonnages so far exposed by development. As previously stated, revenue from these small-scale operations is to be used towards providing funds required for further exploration and development of the mine.

Writing about the prospects for Kansanshi earlier this year (see *Mining Journal*, August 3 issue) we pointed out that when production of both oxide and sulphide ore reached initial targets, the mine would be well on the way to producing some 700 tons of copper monthly—or at the rate of 8,400 tons a year. And although the latest announcements indicate that some delay might be experienced before milling at the full planned rate is achieved, the company should nevertheless soon be earning considerable sums of money.

Naturally future earnings and dividend prospects for Rho-Kats depend entirely upon whether large deposits of sulphide ore can be proved at depth or not. But development results so far published in this respect have given every encouragement that all will turn out well. We still consider these shares to have substantial growth prospects.

RIEBECK DEALINGS START

It is particularly unfortunate that Riebeck Gold Mining Company's initial flotation should have taken place at so inauspicious a time for gold shares. Since the end of June this year the *Financial Times Gold Share Index* has declined from 82 to 73.5 while recent adverse technical disclosures by Zandpan and Merriespruit, together with the Middle Eastern crisis, have reduced interest to an all-time minimum. Under these conditions it is not surprising that the 10s. shares should command a premium of no more than 6d.

As this opening price is considerably lower than most estimates made when details regarding the mine's exploitation

were published last May, it is perhaps worthwhile reviewing the position. Various calculations of potential share values were put forward at that time based on a recovery grade of 7 dwt. per ton, costs of 50s. and an annual milling rate of 1,000,000 tons. An ultimate capital of £5,500,000 was envisaged, and dividends thus seemed to have the eventual chance of totalling some 2s. per share. As a yield of 10 per cent was being suggested as an adequate return, it seemed possible to look for a price of nearly 20s. per share when the company was floated. In the event, the shares have only commanded half this price, and the indicated yield thus becomes 20 per cent.

It is a pretty thankless task at present to recommend any purchases, let alone issues in the gold section. But Riebeck shares certainly seem to be amongst those which would have the chance of capital appreciation should Kaffir markets improve.

A major participant in the original Riebeck issue was General Exploration Orange Free State. This company has now passed out the greater part of its holding to shareholders in the ratio of 6 Riebeck for 10 Geoffries. After going ex-rights Geoffries have now declined to about 4s. This figure would appear to be about right in relation to the disclosed asset position at December 31, 1955—the date of the latest accounts.

ESPERANZA NEEDS MORE MONEY

In his statement to shareholders of Esperanza Copper and Sulphur Company, Mr. J. Ivan Spens, the chairman, disclosed that operations at the Limni Mill had to be stopped last April. This was due to its inability to meet the daily required tonnage capacity, and to heavy losses which were being incurred in the recovery of sulphur, copper, gold and silver. Mr. Spens stated that funds provided by the recent £200,000 Debenture Stock issue had proved inadequate. More temporary facilities were, therefore, required.

It has also been necessary to recalculate ore reserves at Limni. In consequence, ore available at March 31, 1956, dropped to 2,602,500 tons from 5,664,448 tons at the end of the previous year. Drilling at Evloimeni has been disappointing and work in that area was suspended last December.

Standing at little more than their par value of 2s. 6d. Esperanza ordinary shares have fallen from 4s. 14d. during 1956. In view of this latest depressing report, it appears that little hope for their recovery can be entertained in the near future.

CENTRAL MINING - GOLD FIELDS MERGER

Last August Consolidated Gold Fields and The Central Mining and Investment Corporation announced that the question of merging their respective interests was being examined. At that time it was stated that the basis for any such amalgamation

would be the two companies' comparative asset positions. Following the preliminary figures from Gold Fields, shown elsewhere in these columns, this company's asset position at June 30, 1956, will thus become available in some three weeks' time. While this will give a closer idea of the present position, figures from Central Mining as at December 30, 1956, are not due to appear until May, 1957. But should the announcement of merger terms prove to be at all imminent, shareholders may expect to receive an up-to-date asset statement from both companies well before that date.

Apart from Gold Fields' higher distribution, little has occurred since August 27—the date on which the merger announcement was made—to change the relationship between Gold Fields and Central Mining shares. Current prices of 58s. 9d. and 53s. respectively in fact compare with their previous levels of 57s. and 53s. Yet when asset figures are published, some adjustments will naturally have to take place, but it is impossible at this stage to hazard a guess as to what these are likely to be.

LONDON HAS A BAD WEEK

After a long period of remarkable steadiness, London appeared last week to accept for the first time the full economic implications of recent events. The *Financial Times Industrial Ordinary Index* dropped 4.6 points to 168.3—a new low for 1956 and War Loan 3½ per cent receded to an all-time low of £68 5s. 8d. While some investors were suggesting that the time had come to pick up shares at bargain prices, the majority appeared to be anticipating no substantial improvement in the near future. Any hopes of an impending reduction in Bank Rate were dashed by the expense and inflationary effects of Suez.

Wall Street behaviour was similar and the *Dow Jones Industrial Index* fell from 488.72 to 482.36. Attempted rallies were quickly eliminated by profit-taking. It was being more generally appreciated that despite a Republic victory in the Presidential elections, both Houses were under Democratic control.

Starting the week badly Kaffirs later attracted some attention which raised the *Financial Times Gold Share Index* to 73.5 from 72.4. The older producers were assisted by talk of European currency revaluations and the possibility of a higher gold price. Gold Fields moved up on the higher dividend, while Harmony improved on the disclosed expansion plans. Dealings in Riebeck started at a premium of a few pence and Geoffries went ex-rights at 3s. 6d.-4s. O.F.S. issues showed few gains on the week but finance issues were strong.

Tins held their recent gains and Camp Bird fell from about 13s. 9d. to 13d. 3d. Diamonds remained largely unchanged. Platinum held steady. Rhodesian coppers made little headway, although Nchanga attracted some buying. Oils fluctuated violently and finished well down on the week.

Australian Golds showed some losses on Mr. Menzie's statement that devaluation was now unlikely. Lead-zincs fell.

DOORNFONTEIN SHOULD SOON PAY MAIDEN

In his statement to shareholders of Doornfontein Gold Mining Company, Mr. E. S. Hallett, the chairman, stated that the level of profitability now achieved indicated that by June, 1957, it would be possible to declare a maiden dividend. He pointed out, however, that in addition to providing funds for capital expenditure during the current financial year some provision would be made towards redeeming the company's debt of £1,000,000 to the National Finance Corporation of South Africa.

Goldfields Pays More.—With the declaration of a final dividend amounting to 15 per cent on an issued ordinary capital of £4,500,000 in £1 shares, The Consolidated Goldfields of South Africa has raised its total dividend for the year ended June 30, 1956, to 20 per cent from 17½ per cent previously. Subject to audit, profits of New Consolidated Goldfields—the wholly-owned subsidiary—advanced to £1,936,121 from £1,828,726. Tax took £864,000 (£880,000), and a total of £375,000 (£350,000) was placed to investment and exploration reserve. Dividends absorbed £666,541 (£553,594), and the balance carried forward was virtually unchanged at £368,690 against £368,110.

Aluminums' Nine Months' Earnings.—A consolidated net income of \$42,325,290 has been reported by Aluminium Ltd. for nine months' operations ended September 30, 1956. This shows a striking rise from \$36,776,325 during the corresponding period of 1955. Earnings per share thus advanced to \$4.23 per share from \$3.69 previously.

Tin Capital Repayments.—At extraordinary general meetings held on November 7 overwhelming support was received by Kent (F.M.S.) Tin Dredging, Rambutan and Tekka for their proposals to repay capital amounting to 1s. 7s. 6d., and 2s. 6d. per share respectively.

As Camp Bird does not control more than 50 per cent of these three companies' shares, the resolutions for repayments went unopposed.

St. John d'El Rey Passes Dividends.—St. John d'El Rey Mining has decided against paying any interim dividend on either its preference or ordinary stocks for the financial year ending December 31, 1956. Dividends were also passed in 1955.

TECHNICAL ASSISTANTS required in London in Contracts Engineering Department dealing with Mine Car Control Equipment for Collieries and Mines. Some previous experience in this class of work an advantage but not essential. Good opportunities owing to expansion of business. Five-day week. Pension Scheme. Canteen facilities. Write, giving age, experience and qualifications to the Chief Colliery Engineer, Westinghouse Brake and Signal Co., 82 York Way, King's Cross, London, N.1.

RECENT INTERIM DIVIDEND ANNOUNCEMENTS

Company	Year Ending	Latest Dividend	Date payable	This year to date	Last year total
Tongkah Tin (a)	30. 6.56	30	Nov. 28	45	35
Lake View Inv. (b)	31. 3.57	10	Dec. 1	10	24
London Tin	30. 4.57	10	Nov. 30	10	30
Kuala Kampar Tin (c)	31. 3.57	80	Dec. 5	80	140
Tehidy Minerals	31.12.56	5	—	5	15
Rambutan (d)	30. 6.56	5	Nov. 30	32½	35
Rambutan	30. 6.57	5	Nov. 30	5	—
N. Broken Hill	31.12.56	40	—	40	90
Cons. Zinc Corp.	31.12.56	7½	—	7½	22½

(a) No further dividend will be paid for 1955-56.

(b) Latest dividend only indicates further progress towards reducing disparity between final and interim rates.

(c) On £307,500 capital; the 1955-56 final dividend was also paid on this capital.

(d) Fourth interim. Previously 3 interims and 1 final.

RECENT FINAL DIVIDENDS AND PRELIMINARY FIGURES

Company	Year Ended	Final Dividend	Net Profit after tax	Total Dividends
		%	This £(000)	Last £(000)
North Kalgurli (a)	20. 3.56	12½	52	67
Messina (Tvl) Devt.	30. 9.56	250	1,843	1,462
Pahang Cons.	31. 7.56	40	183	202
Lake View	30. 6.56	31½	209	201
Kwahu	30. 6.56	Nil	20	36
Afr. Inv. Tst.	30. 6.56	5	8	19
London Rhod.	30. 6.56	10	61	61
S. Bukuru	31.12.55	Nil	5	3
Sir L. Parkinson	31.12.55	6½	92	70
Lydenburg Gold.	30. 6.56	10.71	N/A	N/A
New Wit. Gold.	30. 6.56	7½	N/A	N/A
Wankie Coll.	31. 8.56	6½	892	824
Trepca Mines	30. 9.56	Nil	47	41
Harrisons & Crosfield (b)	30. 6.56	10	646	611
Gold Fields	30. 6.56	15	1,100	949
Mount Isa (c)	30. 6.56	15	5,702	4,107
Lampa Mining (d)	30. 6.56	30	121	48

(a) Latest dividend on increased capital. Interim for 1956 paid before 1 for 2 issue. Accounting period for 1955-1956 ran fifteen months.

(b) Latest dividend on £1,500,000 capital (1955—£1,000,000)

(c) Australian currency.

(d) Latest dividend includes 20 per cent "Jubilee Bonus". Profits shown are untaxed.

TRANSVAAL AND O.F.S. GOLD AND URANIUM PRODUCERS

Comparison and analysis of salient results for the first nine months of 1956 and 1955

	Heading		Jan. to Sept.	Transvaal Cos.	O.F.S. Cos.	Total
1.	Tons milled :	Millions	1956 1955	44.1 44.3	7.0 5.2	51.1 49.5
2.	Ounces produced :	Millions	1956 1955	9.6 9.3	2.3 1.6	11.9 10.9
3.	Grade per ton :	Dwt.	1956 1955	4.2 4.0	6.6 6.0	4.5 4.2
4.	Working Profits :	Gold £m	1956 1955	25.3 26.9	10.6 6.3	35.9 33.2
5.	Working Profits :	Uranium £m	1956 1955	14.5 11.1	3.2 1.1	17.7 12.2
6.	Total profits :	(4 + 5) : £m	1956 1955	39.8 38.0	13.8 7.4	53.6 45.4
7.	Working costs per ton :	s. d.	1956 1955	40/8 38/9	52/11 51/1	42/4 40/1
8.	Non-European employees at end of Sept.		1956 1955	264,000 260,000	57,000 49,000	321,000 309,000

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BLYVOORUITZICHT GOLD MINING CO. LTD.

The Nineteenth Annual Meeting of shareholders will be held in Johannesburg on November 20, 1956. The following is an extract from the circulated statement by the Chairman, **Mr. W. M. Frames**, dated November 13, 1956.

Working Results

Compared with the figures for the previous financial year, there was little change in the tonnage of ore milled but the yield declined by 0.242 dwt. to 11.258 dwt. per ton. The gold recovered decreased by 9,550 ounces and in consequence the working revenue at £8,958,372 was lower by £109,991. Working costs increased by 3s. 6d. a ton milled due mainly to higher costs of European labour, power and stores and materials, and working profit fell by £357,138 to £5,207,292. There was, however, an improvement in the working profit from uranium extraction of £87,938 to £1,192,764 (subject to adjustment) and total working profit at £6,400,056 was lower by £269,200.

Accounts

Provision for taxation and mineral lease consideration amounted to £3,143,081, dividends declared during the year totalled £2,400,000, a repayment of the capital portion of the uranium loan absorbed £362,680 and £264,890 was transferred to Capital Reserve in respect of expenditure on mining assets and trade investments. The unappropriated balance was thereby increased to £1,635,009.

Development

The total footage developed at 53,228 was 414 feet more than in the previous year. Of the 22,607 feet driven on reef, 17,205 were sampled and 16,280 or 94.6 per cent. were payable at 764 inch-dwt. These results represented improvements of 4.6 per cent in payability and 52 inch-dwt. in value, due mainly to a slightly greater proportion of the reef development being carried out in the richer eastern section of the mine.

The payable ore developed at 1,162,000 tons was 100,700 tons less and the average value of 11.5 dwt. was 0.4 dwt. lower than the figures for the previous year.

Ore Reserve

The available ore reserve, re-estimated at June 30, 1956, to be 5,341,000 tons, was 150,000 tons more than the estimate at the end of the previous June, the value at 12.1 dwt. and the width at 46.4 inches remaining unchanged.

Capital Expenditure

During the year a net amount of £261,650 was spent on the Company's gold mining operations. Of this amount £115,953 was expended on shaft equipment, £69,987 on increasing the pumping capacity of the mine from 14,880,000 gallons a day to 16,800,000 and £50,565 on the erection of a water treatment plant which has now been completed, thus enabling the Company to cease purchasing water from the Rand Water Board. The twin haulages on 6 level from No. 1 Shaft were advanced to the proposed site of the No. 1 Sub-Vertical Shaft, but no further work has been undertaken in connection with the sinking of the Sub-Vertical Shaft. The continuation or otherwise of this work will depend upon the outcome of certain detailed investigations into future mining policy. It is estimated that £520,000 will be spent on

capital account during the current financial year, chiefly on the disposal of water, pumping equipment, equipment for the sub-incline shafts, ventilation, housing and the supply of power underground.

Expenditure on the uranium plant totalled £97,702 during the year and £279,467 was spent on the erection of the sulphuric acid plant.

Uranium and Sulphuric Acid

The uranium plant operated to capacity throughout the year.

Of the total loan of £4,068,281, including capitalized interest, obtained through the Atomic Energy Board for the erection of the uranium plant, an amount of £936,316 has been repaid, leaving a balance of £3,131,965 to be repaid in the remaining 29 equal quarterly instalments.

The construction of the sulphuric acid plant is well advanced and is expected to be completed before the end of the calendar year. The loan of £750,000 arranged through the Atomic Energy Board to finance the construction of this plant, together with accrued interest, is repayable by quarterly instalments over a period of ten years commencing January 1, 1957. At the financial year end an amount of £240,052, including accrued interest, had been drawn against this loan.

Pneumoconiosis (Silicosis)

The Pneumoconiosis Act, 1956, came into force as from August 1, 1956.

HARMONY GOLD MINING COMPANY LIMITED

The Sixth Annual Meeting of Shareholders will be held in Johannesburg on November 19, 1956. The following is an extract from the circulated statement by the Chairman, **Mr. P. H. Anderson**, dated November 12, 1956.

Capital

During the year the 1,857,445 reserve shares were issued and allotted, bringing the issued capital up to that authorized, namely, £4,500,000 in 18,000,000 ordinary shares of 5s. each.

Working Results

The rate of milling was steadily built up from 67,000 tons in June, 1955, to 80,000 tons in June, 1956, the total ore milled during the year under review being 897,000 tons. The average yield per ton milled at 7.705 dwt. was 0.689 dwt. higher than that attained during the previous financial year, and unit working costs, mainly as a result of the increased tonnage, were 6s. per ton milled lower. The working profit from gold was £1,791,284, and the working profit from uranium was £1,059,471 (subject to adjustment), making a total working profit for the year of £2,850,755, equivalent to 63s. 7d. per ton milled.

Accounts

An amount of £128,714, being the difference between sundry items of income and expenditure, was deducted from the total working profit, leaving a profit of £2,722,041 before taxation. There was a transfer to Capital Reserve in respect of expenditure on mining assets and trade investments of £1,276,420, a repayment on account of the capital portion of the uranium loan amounting to £260,114, and a provision for taxation

As a result it is estimated that the costs to the Company in respect of pneumoconiosis will rise from last year's figure of 2s. 1.4d. per ton milled to about 2s. 10.2d. per ton milled for the current financial year.

Current Year's Results

As disclosed in the recently published quarterly report the yield, although below the average for the year under review, was slightly higher than that of the previous quarter. The tonnage milled was at the same level as in the previous quarter but, due to the increased yield and certain additional revenue received in respect of sales of gold between February and July, 1956, the total revenue from gold was higher by some £60,000. It is encouraging to note that working costs decreased by 5d. a ton milled and that working profit from gold was higher by about £68,000 than the figure for the previous quarter.

Satisfactory progress continues to be maintained in the sinking of the four sub-incline shafts, and 6 level haulage is being extended steadily towards the western boundary.

The alteration to the formula for gold mining taxation with effect from January 1, 1956, represents a reduction of slightly more than 4½ per cent. in the formula tax and is therefore welcome. The amortization allowance for taxation purposes will, however, decrease in the future when capital expenditure falls below the high level of previous years and this will tend to increase the taxable income.

of £172, leaving a balance in the Income and Expenditure Account of £1,185,335 to be carried forward to the current year. This unappropriated balance, together with the Abnormal Costs Reserve of £65,093, and the balance of uranium and pyrite loan funds on hand amounting to £334,645, totalled £1,585,073, which sum was represented by net current assets as detailed in the Balance Sheet.

The short-term loan from The Central Mining and Investment Corporation Limited, and Rand Mines, Limited, which at the beginning of the financial year stood at £765,000, was repaid in full during the year. The loan facilities of £3,687,000 arranged through the Atomic Energy Board for the construction of the uranium and the pyrite plants were fully drawn by the end of the year in terms of the loan agreements. This amount, plus £130,998 in respect of capitalized interest to June 30, 1956, gave a total capital indebtedness of £3,817,998, of which £260,114 had been repaid, leaving a balance of £3,557,884 still owing at July 1, 1956; this balance is redeemable in 36 equal quarterly instalments from the beginning of the current financial year.

Development

The footage developed during the year was 51,348 feet, an increase of 19,723 feet over the development accomplished during the previous year. Of the 51,348 feet developed, 20,217 feet were on reef of which 19,065 feet were sampled; 13,560 feet or 71.1 per cent. proved payable at an average value of 14.2 dwt. over a channel width of 33 inches. The occurrence of areas of elevated footwall in the Ventilation

Shaft—3 Shaft zone was one of the two main factors responsible for the substantial decrease in average channel width from 54 to 33 inches, with a consequent decline in both payability and inch-dwt. value; the other main factor contributing to the decrease in the average channel width was that, while development northwards from the Ventilation Shaft has not shown the presence of any areas of elevated footwall, the reef body itself has become narrower.

At September 30, 1956, the 17th level twin haulage which is being driven northwards from No. 3 Shaft had progressed to within 1,500 feet of No. 2 Shaft, and a total of 55 boreholes had been drilled to test the reef body above the haulage. Core losses, varying from slight to heavy, were recorded in 30 of the holes. The 55 boreholes gave an average undiscounted value of 471 inch-dwt. over a channel width of 36 inches. In the first 1,000 feet stretch north of No. 3 Shaft, 4 boreholes were drilled averaging 599 inch-dwt. over a channel width of 68 inches. In the next 1,500 feet, where the narrow channel width exposed possibly indicates the existence of areas of elevated footwall, 24 holes were drilled averaging 340 inch-dwt. over a width of only 18½ inches. In the following 2,000 feet, where two gaps of 600 feet and 500 feet straddling the water fissure zones were left undrilled, 13 boreholes averaged 360 inch-dwt. over a channel width of 43 inches. In the last 1,200 feet the 14 boreholes so far drilled have averaged 14.8 dwt. per ton over a channel width of 53 inches, equivalent to 784 inch-dwt.

Preparations for the sinking and equipping of No. 2 Shaft were completed subsequent to the close of the financial year, and full-scale sinking with the permanent equipment commenced during September, 1956. At September 30, 1956, the Shaft had been sunk to a depth of 481 feet below the collar, had been concrete lined to a depth of 436 feet, and had been equipped to a depth of 270 feet.

Ore Reserve

The payable ore developed during the year amounted to 1,420,000 tons at an average value of 8.6 dwt. per ton over an estimated stoping width of 53.4 inches. This represents an increase of 363,000 tons compared with the previous year, the value being 0.8 dwt. per ton higher and the width 5.4 inches lower. The available ore reserves recalculated at the year end totalled 1,700,000 tons or 769,000 tons more than at June 30, 1955. At 8.5 dwt., the average value of the available reserve was 0.5 dwt. higher than that of the previous estimate, while the stoping width was 3.6 inches lower at 54.3 inches. The calculation of the ore reserve tonnage has been made on a conservative basis.

Expansion in Scale of Operations

Since the close of the financial year, the Board of Directors has decided, now that the sinking of No. 2 Shaft has commenced, to proceed with the next stage in the Company's plans for expanding the scale of mining operations. Plans have been put in hand to increase the milling capacity of the gold reduction plant to 135,000 tons a month from the middle of 1958. An application was submitted during September, 1956, to the Uranium Production Committee of the Atomic Energy Board to extend the

capacity of the uranium production plant.

Capital Expenditure

During the year a net amount of £1,479,544 was spent on capital account in respect of gold mining activities, mainly in connection with No. 2 Shaft, including the permanent headgear and permanent hoisting equipment; on European and non-European housing; and on underground equipment, including pumps and fans. As mentioned under the heading of "Accounts," a sum of £1,276,420 was appropriated from profits to Capital Reserve towards meeting this expenditure. During the current financial year capital expenditure is expected to be approximately £2,000,000, which it is intended should be appropriated from profits. The main items of expenditure now contemplated include the sinking and equipping of No. 2 Shaft; the disposal, by means of large evaporation areas, of underground water which at present is being pumped at the rate of approximately 1,750,000 gallons

a day; and the building of a further 100 houses for employees.

Capital expenditure during the year on the uranium plant amounted to £148,586. The construction of the uranium plant, which now has a capacity of 80,000 tons a month, has been completed except for a few refinements.

A sum of £109,847 was expended during the year on the pyrite flotation plant. The completion of this plant will cost approximately a further £300,000, which sum has already been borrowed in terms of the loan agreements. It is expected that the plant will be commissioned early in 1957.

Taxation

As this Company still has a large balance of unredeemed capital expenditure for tax purposes, it is not at present liable for the formula tax.

Dividend

Dividend No. 1, at the rate of 6d. per share, was declared on 14th September, 1956.

CONSOLIDATED MAIN REEF MINES AND ESTATE, LIMITED

NARROWING MARGIN OF PROFITABILITY

The Fifty-eighth Annual Meeting of shareholders will be held in Johannesburg on November 20, 1956. The following is an extract from the circulated statement by the Chairman, Mr. T. Reekie, dated November 13, 1956.

Working Results

The ore milled during the financial year, at 2,035,000 tons, was lower by 51,000 tons than the tonnage for the previous financial year, and the yield declined from 2.882 dwt. to 2.816 dwt. per ton. Consequently, although there was a slight rise in the average income received by the Company per ounce of gold, the working revenue was £172,807 less than the previous year's figure.

Due to the reduction in the tonnage milled, total working expenditure was lower by £52,242, but mainly on account of increased costs in respect of European labour, power and silicosis contributions, unit working costs were higher by 4d. per ton milled.

In effect the working profit for the year fell by £120,565 to £190,739, which indicates the narrowing margin of profitability in the mine.

Accounts

A credit adjustment of £35,157 in respect of the difference between sundry items of income and expenditure was added to the working profit of £190,739, making a total profit for the financial year of £225,896 before taxation. To this figure the unappropriated balance at the end of the previous year of £434,574, and £19,633 in respect of a retransfer from Capital Reserve on the realization of mining assets and trade investments were added giving a total of £680,103. Appropriations were made for taxation—£7,509, and Dividends Nos. 92 and 93 of 2s. 6d. and 2s. per share respectively—£280,710, leaving an unappropriated balance to be carried forward to the current financial year's accounts of £391,884. This unappropriated balance was represented by net current assets totalling £573,206 as detailed in the Balance Sheet, less Retiring Gratuities and Abnormal Costs Reserves.

Development and Ore Reserve

Primary development has reached the stage at which, due to the low percentage payability encountered, its continuance is considered uneconomic.

Consequently, less development was done during the year and it was more selective in that it was advanced from positions where payable values had been exposed. The tonnage of payable ore developed was also lower. The available ore reserve declined further by 555,000 tons to 1,780,000 tons and it appears inevitable in the circumstances that this decline must be expected to continue.

Pneumoconiosis (Silicosis)

The Pneumoconiosis Act 1956 came into force as from August 1, 1956.

As a result it is estimated that the costs to the Company in respect of pneumoconiosis will rise from last year's figure of 1s. 2d. per ton milled to about 1s. 8d. per ton milled for the current financial year.

Position at the Mine

The Reports of the Directors and the Statements from the Chair in recent years have made it clear that mining operations are being conducted in the face of increasing difficulties. This position has developed mainly because of the steady depletion of the actual and potential reserves of ore which is resulting in a decrease in the number of working places and is causing the control of grade to become more difficult. A gradual reduction in the tonnage of ore milled is therefore now inevitable, but as the remaining ore is scattered and occurs over five different reefs mainly with common shaft systems, it is proving difficult to effect the reduction in mill tonnage and at the same time to decrease working costs commensurably. This problem is aggravated by the adverse effect on costs generally of items such as increased pneumoconiosis charges over which the mine has no control. Under these circumstances, some further reduction in the margin of profit on a declining tonnage of ore milled may be unavoidable during the current year.

THE RENONG TIN DREDGING COMPANY, LIMITED

FINANCE AND EXPANSION

SIR JOHN HAY'S STATEMENT

The Forty-third Annual General Meeting of The Renong Tin Dredging Company, Limited, will be held on November 26 at 19 Fenchurch Street, E.C.3.

The following is an extract from the circulated statement of the Chairman, Sir John Hay:

After dealing with the Company's operations for the past year and acknowledging the services of the Company's Staff in the East the Chairman went on to deal with finance and expansion. He said:—

Current assets in our Balance Sheet amount in total to over £500,000, a formidable sum in relation to our issued capital of £200,000. We have, however, on the other side considerable liabilities for tax etc. But after making allowance for such necessary deductions the remaining figure is an ample one and is for the most part in liquid form. A position of financial strength has hitherto been regarded as something affording satisfaction, a pleasing result of past success, a buffer against any future misfortune, a prudent provision for the cost of renewals and additions and a secure basis for expansion. But other views now find expression, prompted by the blandishments of the "take-over" bidder. But if the business of a tin mining company is to be a continuing one, then there is indeed a real need for building up and maintaining a strong financial position. Rarely, if ever, is tin found in areas so

large as to be capable of being mined for an indefinite period. As a rule each tin bearing area has a limited economic life and if a tin company is to continue as a going concern it must have the financial capacity to acquire and equip successive properties. The money required for such purposes is incomparably greater than it formerly was. Modern equipment involves outlay on a scale never contemplated years ago, when the capital structures were fixed. Our own experience has conformed to this pattern. Our first dredge, purchased as long ago as 1910, cost £16,000. Our latest one was delivered in 1938 at a cost of £150,000, but on recent transfer to Jinjang, it had to be re-equipped at a cost, including re-erection, of over £300,000. In the course of our existence we have acquired a succession of properties and as one has been exhausted we have passed on to others. We are now working three properties. One of these is now nearing the end of its economic life and the dredge thereon will soon be moved to another area. The cost of this operation is estimated at £60,000. We shall then be left with two areas which should provide profitable working for many more years. Nevertheless, the search for fresh tin bearing land is still one of our activities. It may at times be interrupted or impeded by civil disturbances, but is never abandoned.

Despite an original small capital only modestly enlarged later, we have been

able not only to finance all these operations out of our own resources, but to make generous distributions to our stockholders and, at the same time, to build up gradually the sums deemed necessary for continued expansion. Although suffering, in common with others, periodical industrial setbacks and misfortunes, including the disasters of war and enemy occupation, we have already paid to ordinary stockholders dividends totalling over 700% and at the forthcoming meetings we are recommending further payments consisting of a final dividend of 30% and a tax free distribution equivalent to 60%. It is a story of long sustained success, a prospect of continuing prosperity and expansion. It would be strange indeed if any shareholder or stockholder were enticed to part with his interest in this company in exchange for paper of uncertain value.

POWELL DUFFRYN TECHNICAL SERVICES have a vacancy for a Senior Mining Engineer. The successful applicant will be granted a contract with admission to pension scheme and will occupy a responsible position based on London but will be expected to travel abroad when necessary. Applications, which will be treated in strict confidence, should include particulars of education, qualifications, experience and salary required, and should be addressed to the Managing Director, 19 Berkeley Street, London, W.1.

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GOLD RETURNS FOR JULY-SEPT.

SOUTHERN RHODESIAN

Company	July-Sept., 1956			Months since year-end	Current Financial Year Total to date			Last Financial Year Total to date	Tons	Yield (oz.)	Profit (£000)
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)				
Arcturus	9.2	4,048	15.9	3	9.2	4,048	15.9	9.2	3,247	13.3	
Cam & Motor	72.0	24,485	12.5	3	72.0	24,485	12.5	72.0	22,943	122.3	
Falcon Mines	48.0	10,756	49.5	12	230.0	41,510	78.7	210.0	37,850	126.5	
Globe & Phoenix	18.0	11,140	68.2	9	55.0	33,461	207.6	54.0	32,199	209.1	
Motapa Gold*	52.0	7,223	7.1	9	159.0	22,101	21.7	146.0	20,462	10.7	
Muriel Mine	11.0	4,014	30.8	3	11.0	4,014	30.8	9.9	3,210	30.1	
Tebekwe	0.6	1,916	5.4	3	0.6	1,916	5.4	15.0	2,645	3.9	

* Excluding premium gold sales.

L indicates a loss.

INDIAN

Company	July-Sept. 1956		Months since year-end	Current Financial Year Total to date		Last Financial Year Total to date	
	Tons (000)	Yield (oz.)		Tons (000)	Yield (oz.)	Tons (000)	Yield (oz.)
Champion Reef	52	15,953	9	144	47,479	128	45,394
Mysore	58	15,161	9	171	45,670	143	44,668
Nundydoo*	64	19,586	9	181	50,341	169	51,715

* Including tailings.

WEST AFRICAN

Company	July-Sept. 1956			Months since year-end	Current Financial Year Total to date			Last Financial Year Total to date	Tons	Yield (oz.)	Profit (£000)
	Tons (000)	Yield (oz.)	Profit (£000)		Tons (000)	Yield (oz.)	Profit (£000)				
Amal Banket	190	39,125	64.8	12	633	105,777	162.9	961	149,638	373.2	
Ariston	118	33,126	136.0	12	328	90,002	319.2	346	131,299	568.2	
Ashanti	78	64,210	360.9	12	216	183,406	649.1	308	197,574	840.4	
Bibiani (1927)	90	2,048	36.9	12	259	38,983	17.5	359	75,617	145.5	
Bremang*	2,428	12,988	56.9	9	6,760	30,558	104.9	6,690	30,784	99.3	
Konongo	14	12,465	60.0	12	29	19,176	134.7	41	37,749	187.2	

* Cu. yds. dredged. Profit figures include premium revenue.

CAPPER PASS & SON

EFFORTS TO COMBAT ADVERSE CONDITIONS

MR. A. D. PASS ON THE RAW MATERIAL POSITION

The 45th annual ordinary general meeting of Capper Pass and Son Ltd. was held on November 15 in Bristol. **Mr. A. D. Pass, O.B.E., D.L., J.P.**, the chairman, presided.

The following is his circulated address:

Your Company continues to be ground between the upper millstone of continuing cost of inflation and the nether millstone of margins that cannot be materially increased by reason of overseas competition; for a number of countries have succeeded over the past few years in holding their price levels more stable than this country. We also suffer from heavier taxation than our foreign competitors.

Since I spoke to you last year the pace of inflation has quickened. Coke is the largest single item of our costs. The cost of coke has risen thus, taking the level of December 1952 as 100:—

	Coke (delivered our Works)
December, 1952 ...	100
" 1953 ...	107
" 1954 ...	112
" 1955 ...	140
November, 1956 ...	150

In view of this trend it is not surprising that our smelting and trading profits are down on 1954-55.

During the year under review we also suffered from a dislocation of our ore supplies due to dock strikes.

Growing Use of Fuel Oil

What then are we doing to cope with these conditions? On the one hand we work continuously to reduce the costs of treating our present raw materials. Coke and coal continue to rise in price so we must use less, either by its more economic use, or by the substitution of fuel oil. We have, in fact, to some extent replaced coal by oil at both our Melton and Bedminster plants and propose to extend the use of this, the only fuel that has not been nationalized.

We also mechanize every operation where there is a saving in cost or improvement in process operation to be gained.

On the other hand we seek always for fresh sources of complex raw materials to treat, be they ores or secondary materials.

In this connection Mr. E. H. Jones, your Joint Managing Director, has recently been on a visit to Bolivia and the United States, surveying the raw material position.

The Current Year

As far as the current year is concerned we have obtained, in general, a good intake of raw material, but as I said before, competition is keen and costs have risen sharply.

The profits for the first six months of this year are, therefore, again somewhat down to the previous year. Certain new plant will be coming into operation about the end of 1956 which will enable us to extend the range of raw materials we can treat and hence increase our throughput. This will hardly be ready in time to have much effect on the results of the current year. Meanwhile, our liquid resources remain adequate and should enable us both to finance any purchase of raw material we may need to make, or to erect new plant. At a

time of active "credit squeeze" ready cash is of considerable importance to a business such as this.

All in all, then, let us not be too pessimistic. I would far sooner have been able to tell you that profits were somewhat up on last year rather than the reverse, but the position of Capper Pass to-day is one that we share with quite a number of companies to whom export trade is important.

We have a good team and I wish to thank all the employees of Capper Pass and Son and Victor G. Stevens on your behalf for the results we continue to achieve in the face of adverse conditions which are not of our making.

The report was adopted.

LONDON & AFRICAN MINING TRUST

The seventeenth annual general meeting of London and African Mining Trust, Ltd., was held on November 14 at Winchester House, London, E.C.

Mr. W. J. C. Richards, Chairman, presided.

The following is an extract from his statement circulated with the report and accounts for the year ended September 30, 1956:—

1955 was an active year on the Stock Exchange. Unfortunately, the movement did not extend to gold mining companies, in which a large proportion of our investments were formerly held. Our investments in gold mining companies and in financial companies mainly concerned with gold mining have accordingly been reduced. The proceeds have been utilized in increasing our holdings in oil companies, which now represent 48% of the market value of our portfolio.

On the recommendation of an independent and well-known mining engineer further work has been done on the lead zinc property in Nigeria, which Mines Development Syndicate owns. The results are most encouraging. The ore bodies which have been revealed justify equipping the property to mill 500 tons of ore a day, and the necessary capital will be sought as soon as market conditions are favourable. I have no reason to change my view that this will prove a rich mine which can be worked at a low cost.

The net profit for the year is practically the same as that for the previous year, as also is the transfer to Investment Reserve. The dividend we recommend has been slightly increased to 4d. per share, less tax. Your Directors consider the increase justified, as the re-arrangement of our investments to which I have referred has placed the company in a stronger position.

The report and accounts were adopted.

AN EXPLORATION COMPANY is considering undertaking prospecting operations in Eire. Any companies interested in base metal or non-metallic minerals in this area, are invited to contact Box No. 589, The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2.

TEKKA, LIMITED

MR. D. W. THOMAS'S REVIEW

The Thirty-sixth Annual General Meeting of Tekka, Limited was held on November 7, 1956, at The Thornton Hall, Redruth.

Mr. D. W. Thomas (Chairman), presided.

The Reports and Accounts for the year ended March 31, 1956, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Reports and Accounts, which was as follows:—

The Accounts for the financial year ended March 31, 1956, show a profit of £13,202 after payment to the Malayan Government of £11,569 as Royalty on Ore Sales and provision of £14,745 for United Kingdom and Malayan Taxation (less credit for Malayan Tax).

Three dividends totalling 1/1½d. per share, absorbing a nett amount of £11,597 were paid to Shareholders. Two of these dividends, each at the rate of 3d. per share, were paid on the former nominal capital of £1 each. The third dividend of 7½d. per share was paid on the present reduced nominal value of 15s. per share. The balance of £28,619 brought forward from the previous year was increased to £30,224 which the Directors propose to carry forward.

The Report of our General Managers, Messrs. Osborne and Chappel, circulated with the accounts gives particulars and comparative results at the Mine.

During the year 138.23 tons of tin-ore were recovered from 335,100 cubic yards of ground treated, this output being slightly less than that of the previous year.

During the current financial year the output for the first six months was 64½ tons of tin-ore, and in their report the General Managers state that it is anticipated that production will be maintained at a level comparable with that of the year under review.

I referred last year to the International Tin Agreement and stated that it then awaited ratification by the producing and consuming countries concerned. Since then all necessary ratifications have been received, but as yet it has not come into operation so as to restrict output.

Since the close of the year under review a capital repayment of 5/- per share has been made. A further consideration of the Company's position and commitments has been made and it has been decided to recommend a further repayment of 2/6 per share.

The Directors record their thanks to the General Managers and the Manager and Staff at the Mine and their appreciation of their loyal service under conditions which still entail constant vigilance.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

At the close of the meeting two Shareholders (Mr. T. J. Brooksbank and Mr. J. C. Penberthy) moved a resolution which was carried unanimously, paying tribute to the Directors' conduct of the affairs of the Company. They considered that the proxy vote, namely, 277,762 in favour and 1,678 against, on the resolution to repay 2s. 6d. per share to shareholders, submitted at the Extraordinary General Meeting, showed absolute confidence of the Shareholders in the policy of the Board.

THE CHAMPION REEF GOLD MINES OF INDIA, LTD. NUNDYDROOG MINES, LTD.

MR. M. A. SREENIVASAN'S SPEECH

At the Annual General Meeting of each of the above-named Companies held at Oorgaum, Mysore State, on November 8, Mr. M. A. Sreenivasan presided.

The results and accounts for the year ended December 31, 1955, were reviewed when reference was made to the dividend of 7½% declared by the Nundydroog Company for the year 1955.

Dealing with the nationalisation of the Mining undertaking of the Companies' subsidiaries, the Chairman referred to the circular sent to shareholders on September 30, 1956, wherein particulars were given of the Kolar Gold Mining Undertakings (Acquisition) Bill, under which provision is made, *inter alia*, to pay compensation to the respective Companies' subsidiaries, viz. The Champion Reef Gold Mines of India (KGF) Ltd. and Nundydroog Mines (KGF) Ltd., amounting to Rs.52,81,000 (£396,075) and Rs.63,48,000 (£476,100) respectively. The Bill was passed by the Mysore Legislature on October 18, 1956, and received the assent of the President of India on October 29, 1956.

Mr. Sreenivasan went on to say "Three-fourths of the compensation will become payable to the KGF Company on the vesting date, which is to be not later than November 30, 1956. The remainder is to be paid within three months thereafter, subject to retention by the Mysore Government of part or the whole of this remainder to meet any claim which might be referred to arbitration by the Government of Mysore in respect of actions of the Companies prior to the vesting date which in the Government's opinion were not reasonably necessary or were made with unreasonable lack of prudence. It is not expected that material reduction of compensation will result from this proviso."

"You will recall that the figures of compensation previously announced by the Government of Mysore were far lower, and that in response to the earnest, reasoned and continued representations of your Directors, the Government of India was persuaded to raise the compensation to the level at which it now stands."

"Your Directors and Managers are giving urgent consideration, in consultation with the Company's legal advisers and auditors, to the programme for putting the Company and its subsidiary into liquidation with a view to distributing the compensation and the sterling assets to shareholders as speedily as possible."

As these were to be the last Annual General Meetings of the Companies, Mr. Sreenivasan wished on behalf of his colleagues on the Board of Directors and of himself, to thank all the shareholders—those present at the meetings and the many more in India and in the U.K. and elsewhere who were not at the meetings—"for the confidence and support you have given us."

Exciting and Trying Years

Continuing, the Chairman said, that the past few years have been exciting and trying years in the Companies' long and proud history. In the Nundydroog Mine, exciting because of the notable

discovery of the extensive West Reef which has vastly enhanced the potential wealth of the Mine, trying because the mining undertaking on the Kolar Gold Field along with the other undertakings on the Field has had many other new and complex problems and situations to encounter and to surmount.

The Champion Reef Mine is now the deepest in the world, having reached and passed the vertical depth of 10,000 feet. As shareholders know, a nearly calamitous rockburst in the Biddick Shaft this year crippled the Mine seriously and cut out a third of its working area. Coming at a time when the financial position of that Company was far from satisfactory, this grave set-back might have resulted in the premature closure of the Mine but for the decision of the Directors—in keeping with past tradition—to continue to work the Mine and intensify the search for ore. Fortunately, satisfactory developments served to offset the loss, and rewarded the decision to continue, although considerable expenditure should

be incurred before normal working can be resumed in the affected area.

The Chairman continued: "You are all aware of the swift march of events in the past few months and weeks culminating in the nationalisation of your subsidiary Company. If, at the end of it all, the terms of the compulsory acquisition can be regarded with some measure of satisfaction, your Directors have reason to feel comforted, and I know I am voicing the feelings of every one of my colleagues when I say that our sincere thanks are due to you for your patience and understanding and for the unfailing support you have given us, and to your Managers, John Taylor and Sons (India) Private Limited, and the Company's staff for the devoted services rendered by them."

"John Taylor and Sons have been responsible for the management and technical direction of your Company since its inception, a record perhaps unequalled in the history of deep mining. I am sure you will wish to join me in offering them a special word of thanks and appreciation for all that they have done for the Company and its shareholders."

The Report and Accounts of each of the two Companies were adopted.

THE PERAK RIVER HYDRO-ELECTRIC POWER CO.

CONTINUED DEMAND FOR POWER

The 30th annual general meeting of The Perak River Hydro-Electric Power Company, Ltd., was held on November 14 in London. Mr. Hugh G. Balfour (the Chairman) presiding.

The following is an extract from his circulated statement:

The Company's undertaking in Malaya once again produced a satisfactory result in spite of costs which have risen steadily during the year. The demand for power continued throughout the year during which 436.1 million units were generated as compared with 432.1 million units in the year before, whilst the maximum system peak load rose to 68.9 mW. as compared with 67.4 mW. previously. Due to a higher river flow, the hydro-electric power station at Chenderoh generated 195.1 million units or an increase of 5.7 per cent. on last year.

In consequence of the greater output at Chenderoh, the steam stations at Malim Nawar and Batu Gajah generated 241 million units as compared with 247.5 million units last year. The heavy loading of the Company's system puts a high premium on efficient maintenance, particularly of boilers, and the increased costs shown in the Accounts are in part due to the necessary heavy maintenance programme.

I mentioned last year that an order had been placed for a new 12 mW. turbo alternator and ancillary 140,000 lb. per hour boiler for Malim Nawar. This set is due to come into operation in 1958. The situation with regard to development by the Central Electricity Board of hydro-electric power in the Cameron Highlands is not yet clear, and in view of the increasing load on the Company's system, your Directors decided to order a further 12 mW. generating set which is scheduled for operation in 1959. These two new sets are to a certain extent replacement of existing generating capacity which is

nearing obsolescence and consideration will have to be given in the near future to further additions unless substantial bulk supplies become available from the Central Electricity Board.

Our Subsidiary, The Kinta Electrical Distribution Company, Ltd., had another satisfactory year. A full programme of extension and development was carried out.

The gross revenue from sale of current and miscellaneous income at £1,618,470, shows a slight increase over the previous year. The balance transferred to Net Revenue Account was £877,910, a decrease of £32,290. The sum provided for Depreciation Account has this year been increased to £275,000 and taxation takes £315,000, leaving a balance of profit for the year of £287,910, which after addition of the balance of £130,555 for the last account, brings the total sum available up to £418,465. We have transferred £125,631 to General Reserve which now totals £633,000.

The Directors recommend payment of a final dividend of 6 per cent on the Ordinary Shares, making 10 per cent. for the year.

In the current year we should be able to look for a continuation of demand equivalent to that of the year under review. Returns for the first three months are satisfactory, and in the absence of any unforeseen circumstances and providing costs remain at their present level, our next Accounts should be no less favourable than those presented for the year ended July 31, 1956.

The report and accounts were adopted.

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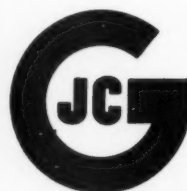
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